Jan Erik Gulbrandsen • Arve Melhus

nye MEGA 10A

Matematikk for ungdomstrinnet

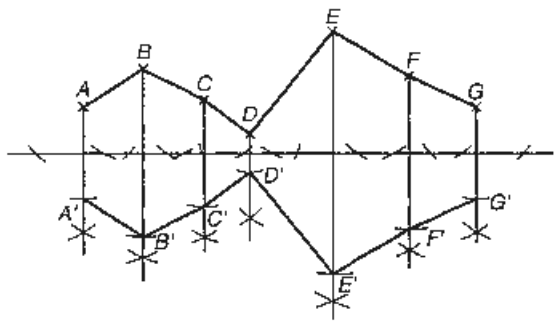
Fasit

Grunnbok 10A

DAMM

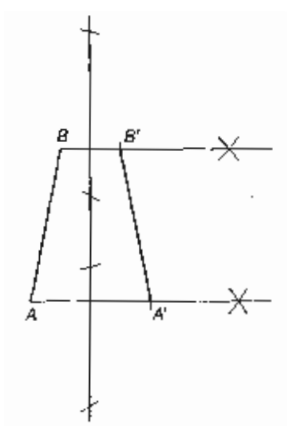
NYE MEGA 10A
FASIT TIL KAPITTEL A GEOMETRI 1

A 1



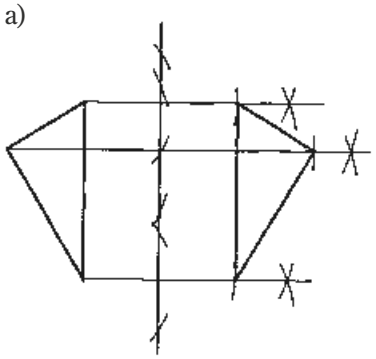
Konstruer speilbildet av endepunktene til linjestykkene og trekk linjer mellom de nye punktene./Konstruer spegelbiletet av endepunkta til linjestykka og dra linjer mellom dei nye punkta.

A 2



A 3

a)



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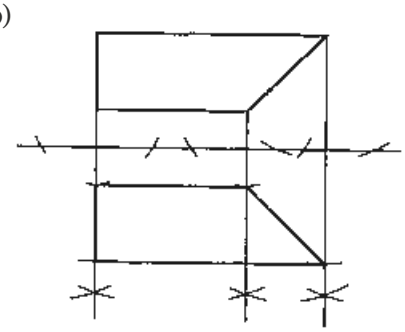

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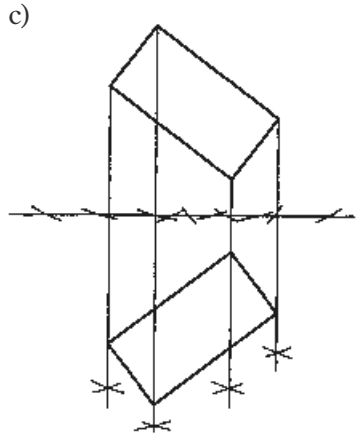

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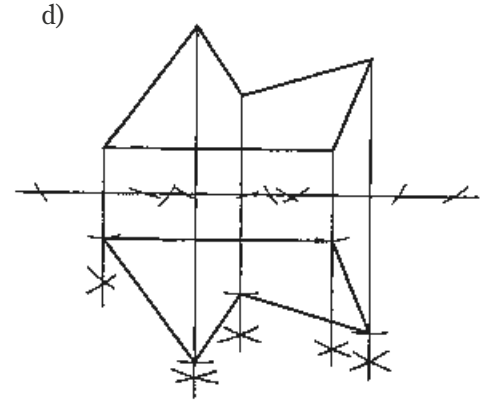

A 4

A 5

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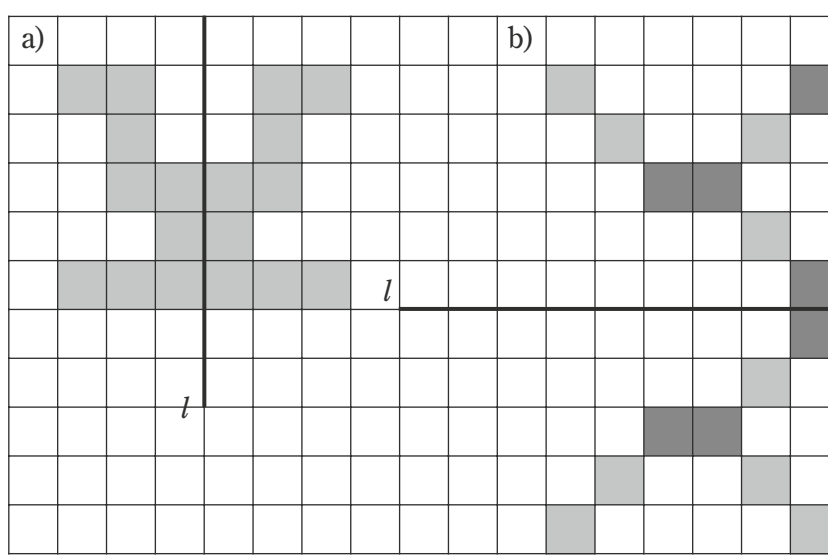
A 6



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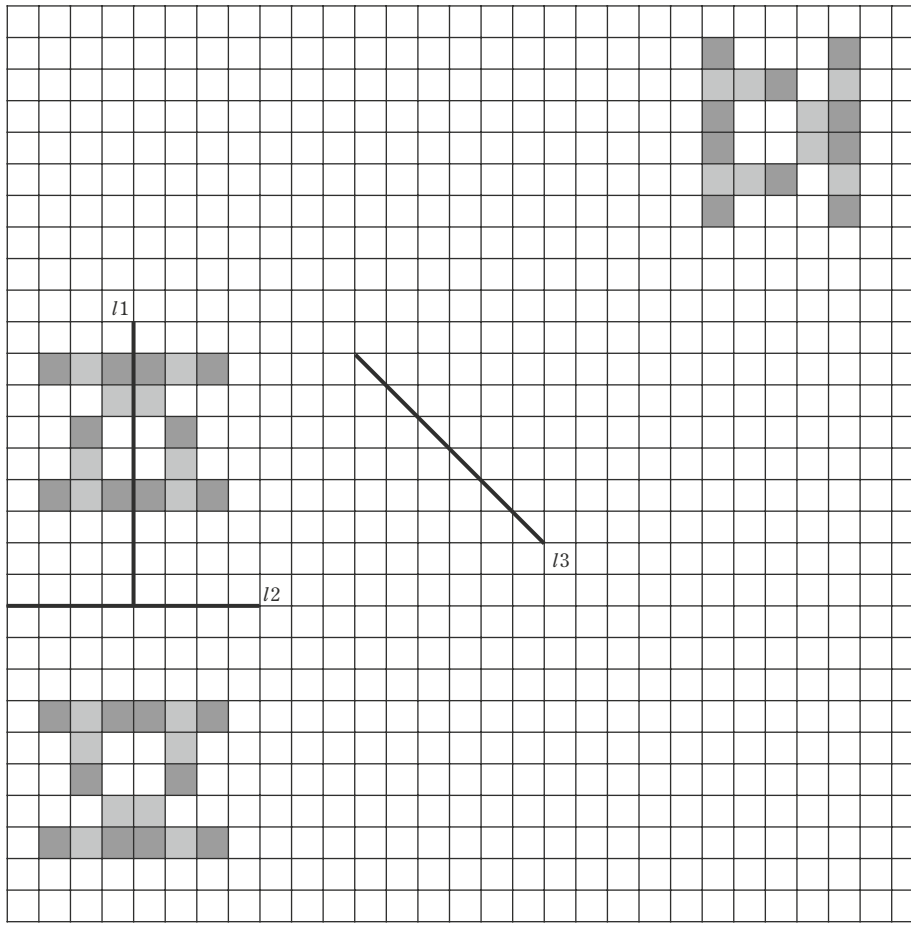
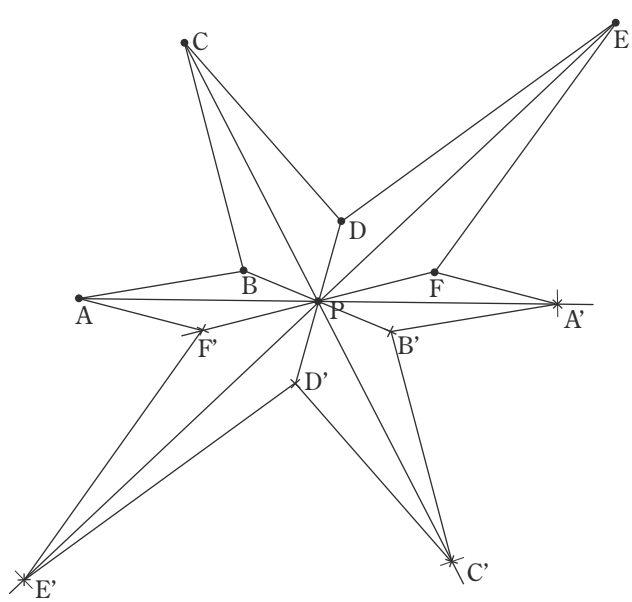
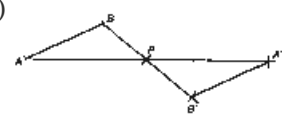


A 8



A 9

a)



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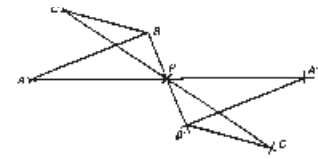

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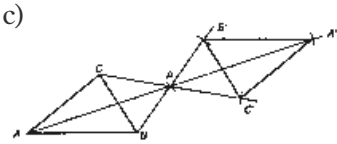

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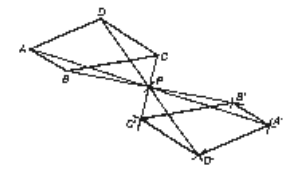
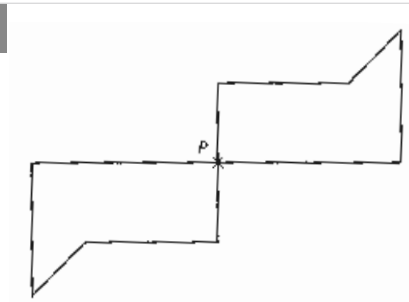


A 10

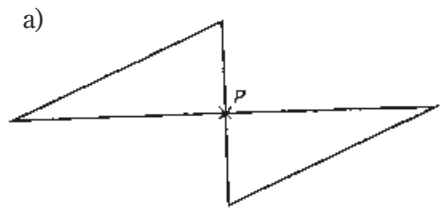
a) Rotasjonssymmetrisk om *P*, 90°
b) Rotasjonssymmetrisk om *P*, 60°
c) Ikke rotasjonssymmetrisk om P/Ikkje rotasjonssymmetrisk om *P*
d) Rotasjonssymmetrisk om *P*, 120°

A 11



A 12

a)



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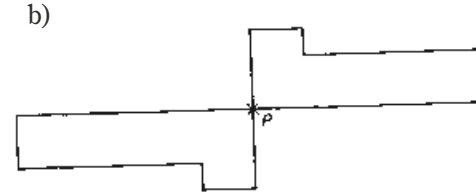

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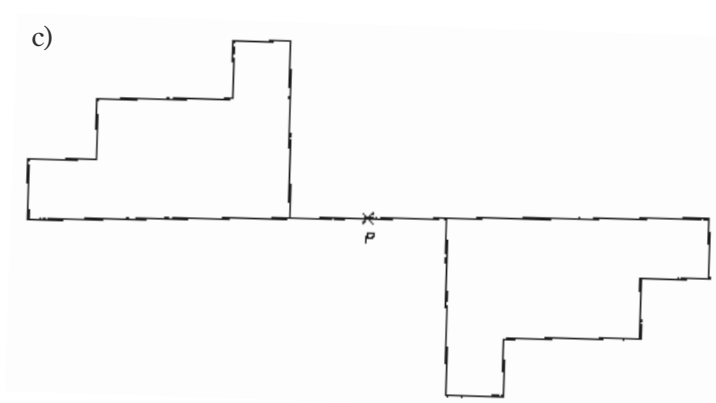
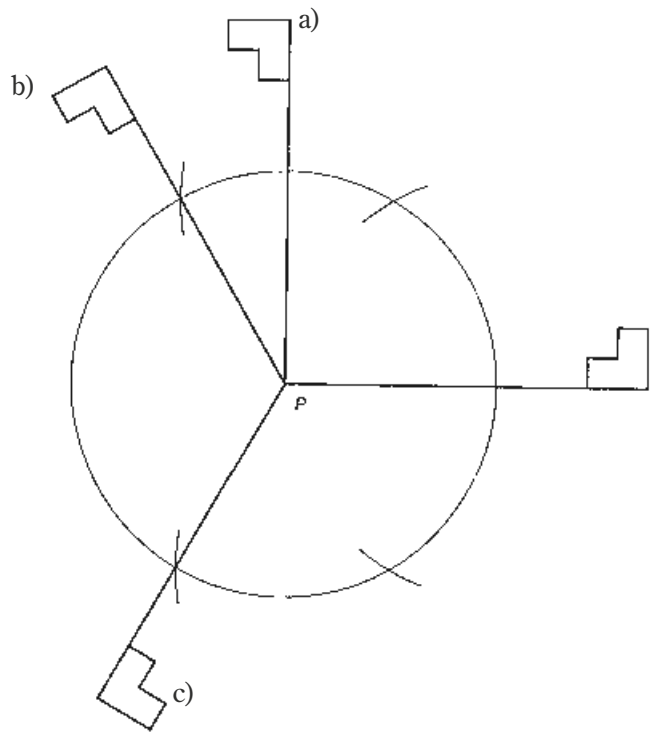
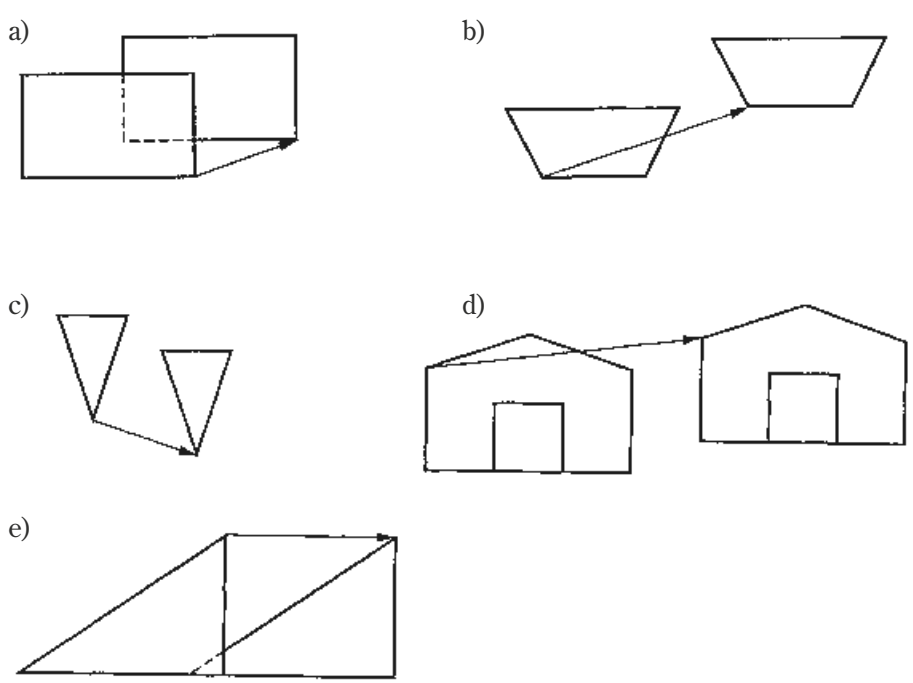


A 13

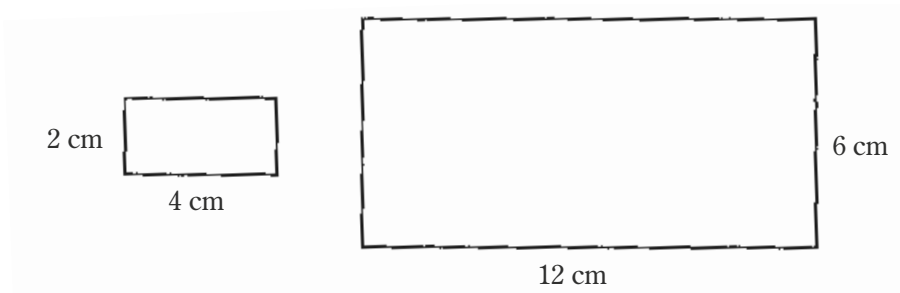


A 14



A 15 Par 3 og par 4.

A 16 Fasit viser ikke figurene i riktig størrelse. Målene er riktige./Fasiten viser ikkje figurane i rett storleik. Måla er rette.

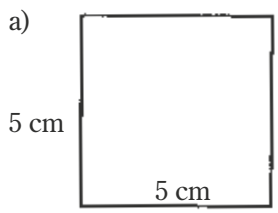


A 17 3 : 2

A 18 3 : 2

A 19

a)



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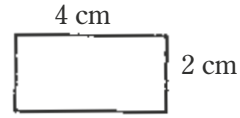
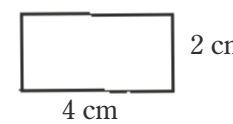
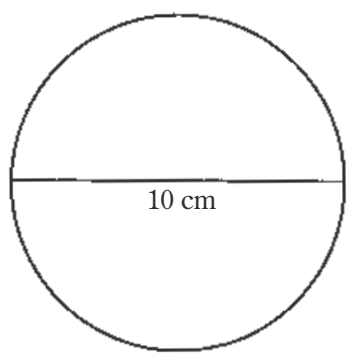


c)



d)



A 20 1 : 100

A 21 1 : 5

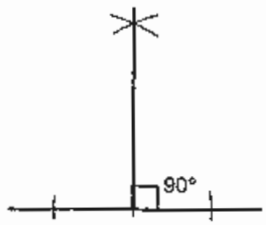
A 22 1 meter

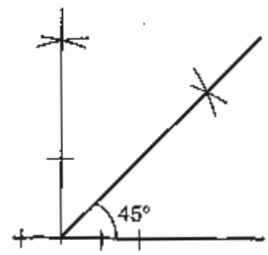
A 23 b) og c)

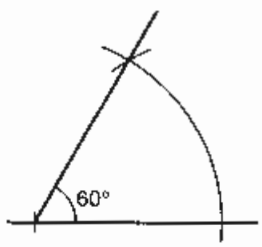
A 24 Avbildningen er like stor som originalen./Avbildninga er like stor som originalen.

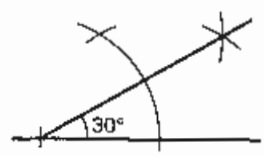
A 25 a) 1,25 km b) 2,55 km c) 3,5 km

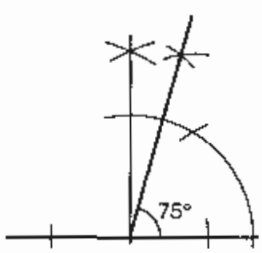
A 26

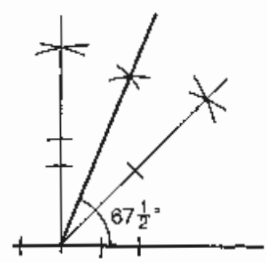


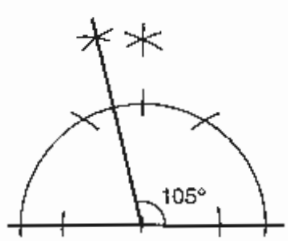


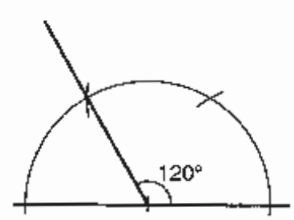


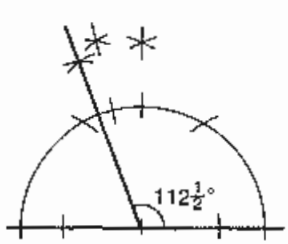






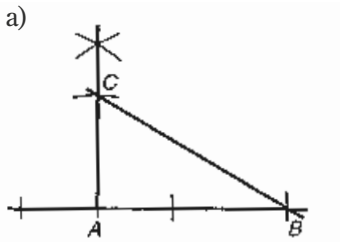






A 27

a)



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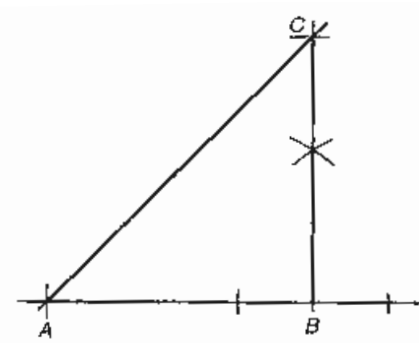

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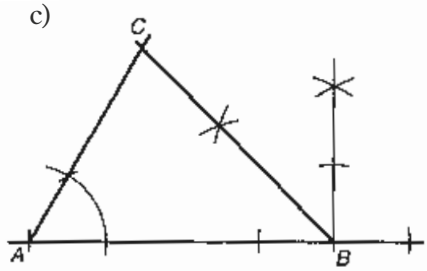

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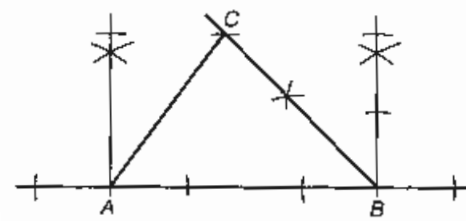

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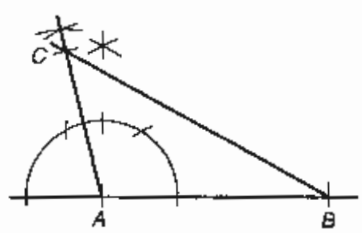

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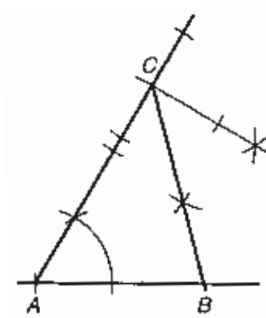
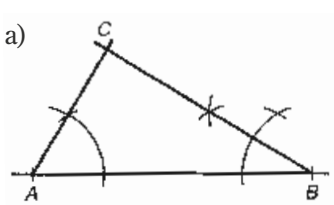


A 28

a)



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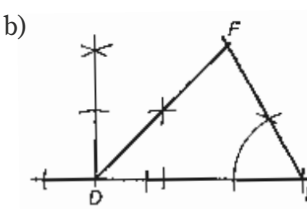

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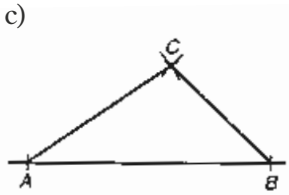
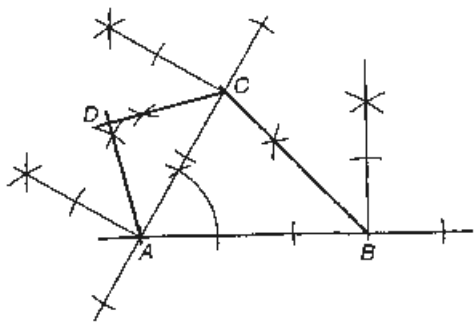


A 29



A 30

a) ≈ 8,6 cm b) ≈ 5,8 cm c) ≈ 8,1 cm

A 31

a) ≈ 6,7 cm b) ≈ 6,3 cm c) ≈ 8,9 cm

A 32

a) ≈ 11,4 cm b) ≈ 10,2 cm c) ≈ 10,4 cm

A 33

a) Nei b) ≈ 4,0 cm

A 34

Den pytagoreiske læesetning gjelder for rettvinklede trekanter. Denne trekanten er likebeint./Den pytagoreiske læresetninga gjeld for rettvinkla trekantar. Denne trekanten er likebeint.

A 35

a) 5 b) Ja c)

a	b	c
3	4	5
5	12	13
15	8	17

d) – e) –

A 36

a) Trekant 1: $x = 8$ cm
Trekant 2: $x = 6$ cm
Trekant 3: $x = 5$ cm

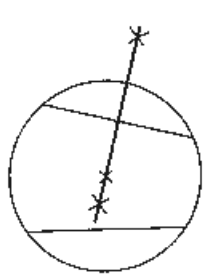
b) Trekant 1 ≈ 6,9 cm
Trekant 2 ≈ 5,2 cm
Trekant 3 ≈ 8,7 cm

A 37

a) og c)

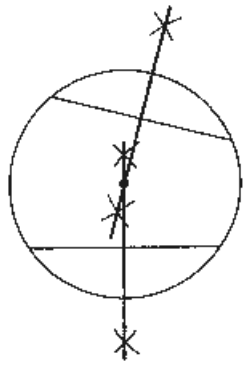
A 38

a)



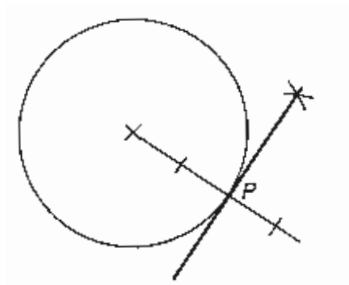
b) Midtnormalen til korden går gjennom sentrum i sirkelen.

A 39

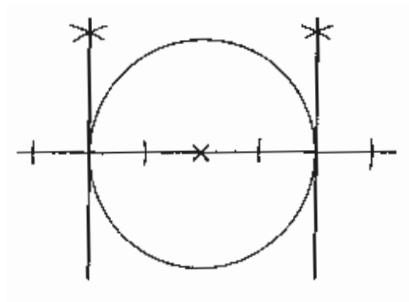


Sentrum i sirkelen ligger på skjæringspunktet mellom de to midtnormalene./Sentrum i sirkelen ligg på skjeringspunktet mellom dei to midtnormalane.

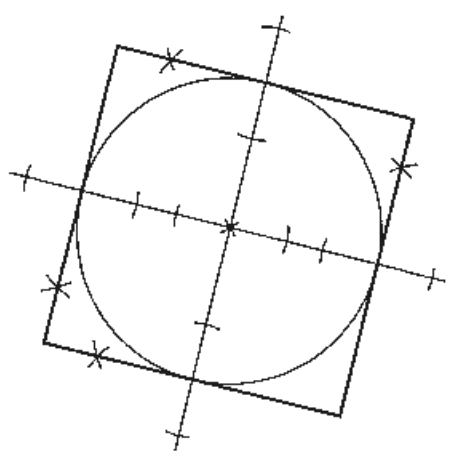
A 40



A 41



A 42



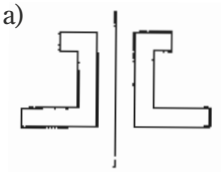
Figuren er et kvadrat med sider lik diameteren, 12 cm./Figuren er eit kvadrat med sider lik diameteren i sirkelen, 12 cm.

A 43

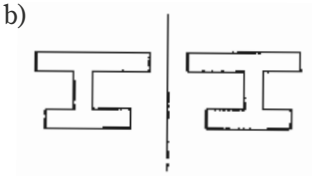
a) $\approx 55\ cm^2$ b) $\approx 451{,}4\ cm^2$ c) $\approx 25{,}1\ cm^2$ d) $\approx 283{,}5\ cm^2$

A 44

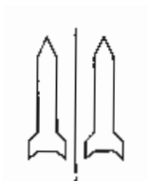
a)



b)



c)



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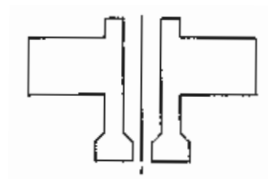
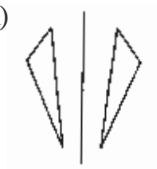
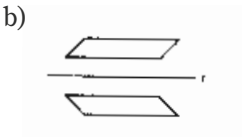


A 45

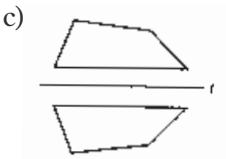
a)



b)



c)

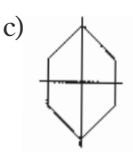


A 46

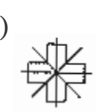
a)

b)

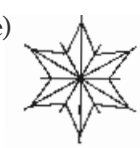
c)



d)

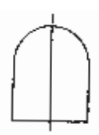


e)



f)

g)



h)

i)

A 47

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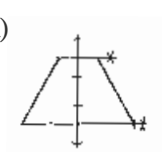
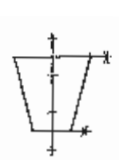
A 48

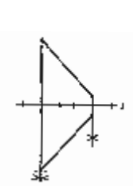
a)



b)

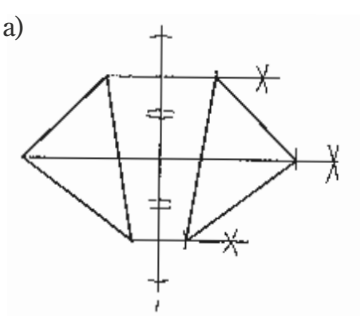


c)

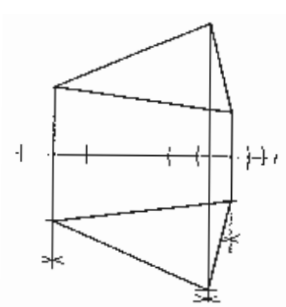


A 49

a)

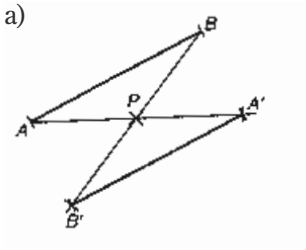


b)

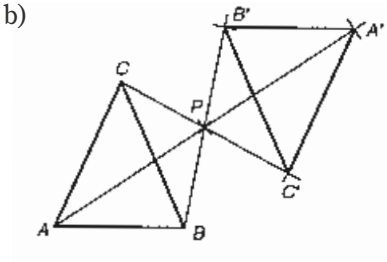


A 50

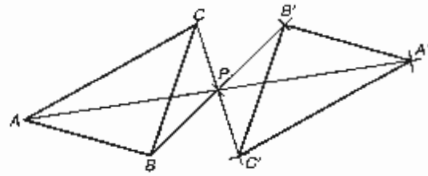
a)



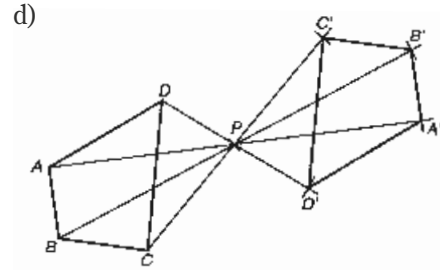
b)



c)

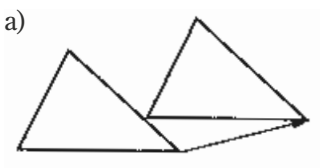


d)

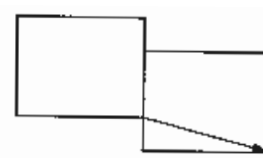


A 51

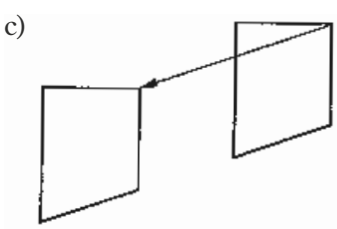
a)



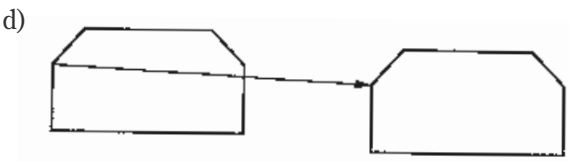
b)



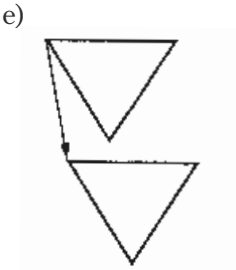
c)



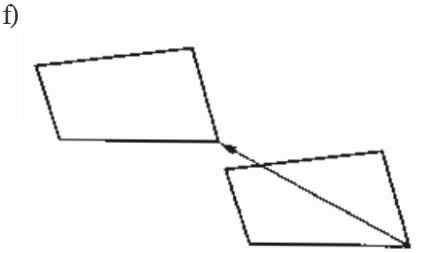
d)



e)

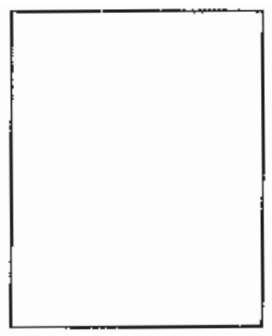


f)

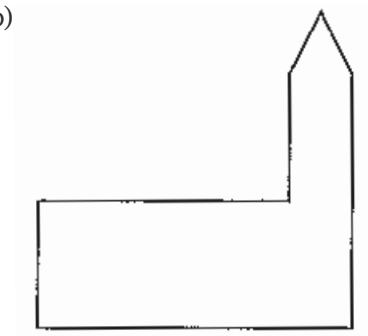


A 52

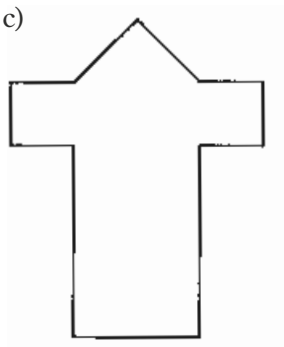
a)



b)



c)



I oppgavene a), b) og c) går vi ut fra ruter på 0,5 cm · 0,5 cm./
I oppgåvene a), b) og c) går vi ut frå ruter på 0,5 cm · 0,5 cm.

A 53

Målestokk 3 betyr at alle figurene skal forstørres tre ganger./Målestokk 3 vil seie at alle figurane skal forstørrast tre gonger.

A 54

a) Halver lengdene på figuren.

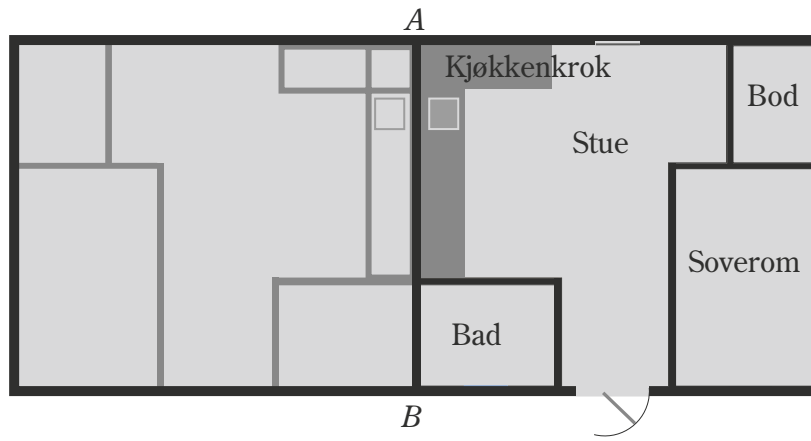
b) Lengdene på den nye figuren blir $\frac{1}{3}$ (formel) av de opprinnelige./Lengdene på den nye figuren blir $\frac{1}{3}$ av dei opphavlege.

c) Lengdene på den nye figuren blir $\frac{1}{4}$ av de opprinnelige./Lengdene på den nye figuren blir $\frac{1}{4}$ av dei opphavlege.

d) Halver lengdene på figuren.

A 55

a)



b) ≈ 23,5 m² c) ≈ 5,5 m² d) ≈ 2,5 m²

A 56

–

A 57

a) 100 m b) Olefjell c) 800 m d) 980 m e) ≈ 2,9 km

A 58

a) $x \approx 7{,}2$ cm b) $x \approx 5{,}7$ cm c) $x \approx 7{,}6$ cm d) $x \approx 6{,}4$ cm

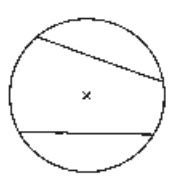
A 59

a) $x \approx 4{,}9$ cm b) $x \approx 7{,}4$ cm c) $x \approx 6{,}0$ cm d) $x \approx 3{,}3$ cm

A 60

a) $x \approx 6{,}0$ cm b) $x \approx 5{,}1$ cm

A 61

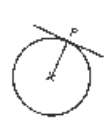


A 62

Diameteren er en korde fordi begge endepunktene ligger på sirkelen./
Diameteren er ein korde fordi begge endepunkta ligg på sirkelen.

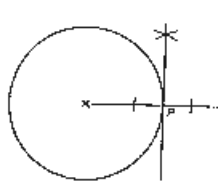
A 63

a) 

b) 

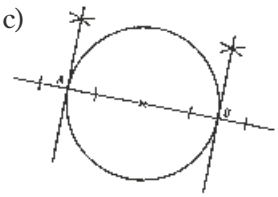
c) 

A 64



A 65

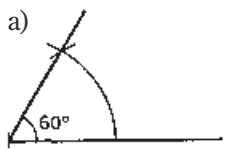
a) b) c)



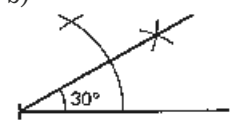
d) Tangentene er parallelle./Tangentane er parallelle.

A 66

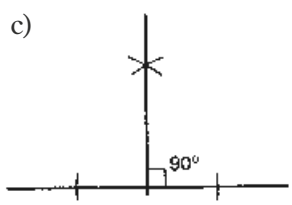
a)



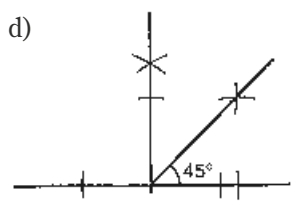
b)



c)

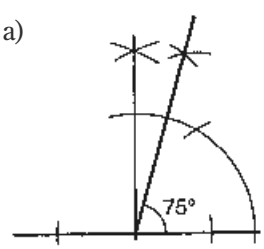


d)

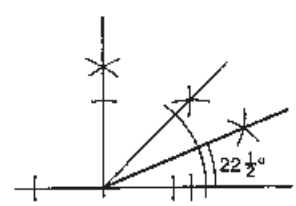


A 67

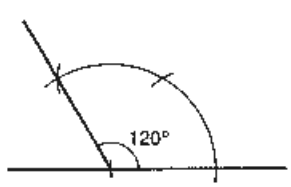
a)



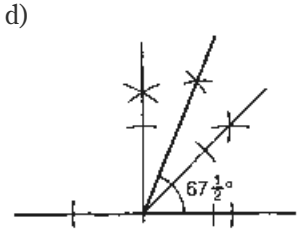
b)



c)

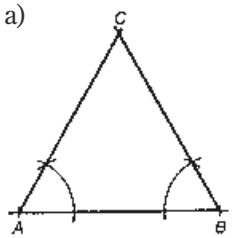


d)



A 68

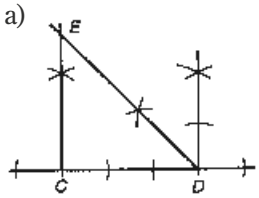
a)



b) $\angle C = 60^o$

A 69

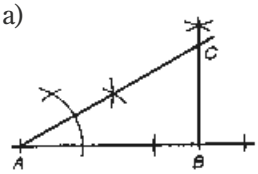
a)



b) $\angle E = 45^o$

A 70

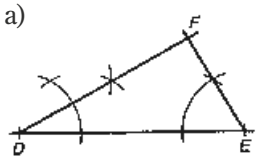
a)



b) $\angle E = 60^o$

A 71

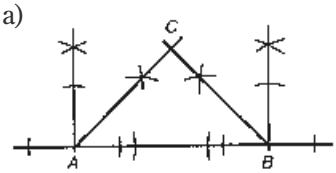
a)



b) $\angle F = 90^o$

A 72

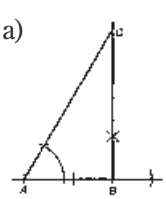
a)



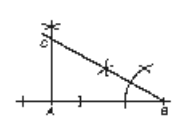
b) $\angle C = 90^o$

A 73

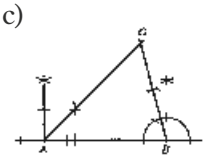
a)



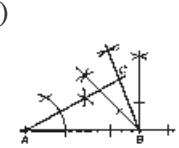
b)



c)

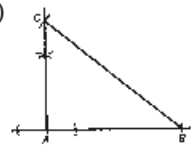


d)

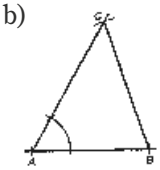


A 74

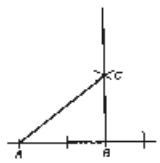
a)



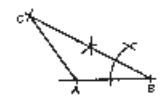
b)



c)



d)

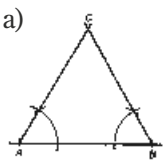


A 75

a) Rettvinklet trekant/Rettvinkla trekant
b) Likesidet trekant/Likesida trekant
c) Likebeint trekant
d) Rettvinklet, likebeint trekant/Rettvinkla, likebeint trekant
e) Rettvinklet trekant/Rettvinkla trekant
f) Likesidet trekant/Likesida trekant

A 76

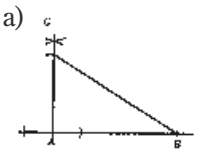
a)



b) $\angle C = 60^\circ$
c) Likesidet trekant/Likesida trekant

A 77

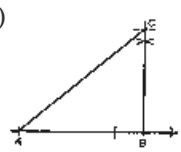
a)



b) Rettvinklet trekant/Rettvinkla trekant

A 78

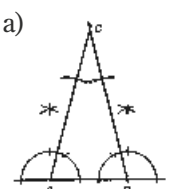
a)



b) Rettvinklet trekant/Rettvinkla trekant

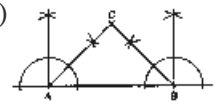
A 79

a)



b) $\angle C = 30^\circ$
c) Likebeint trekant

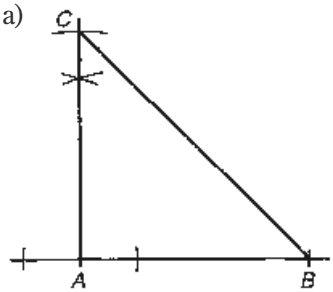
A 80

a) 

b) $\angle C = 90^\circ$

c) –

A 81

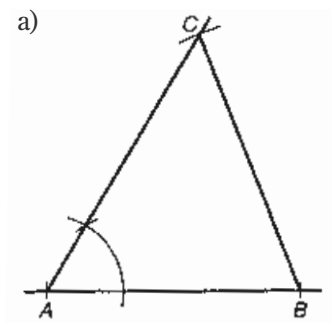
a) 

b) $\angle B = \angle C = 45^\circ$

c) Rettvinklet, likebeint trekant/
Rettvinkla, likebeint trekant

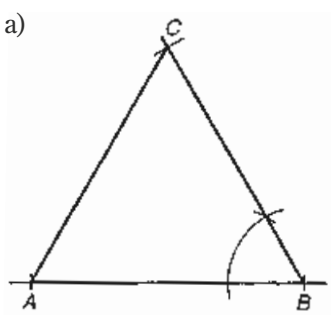
d) –

A 82

a) 

b) –

A 83

a) 

b) $AC = 7{,}2$ cm

c) Likesidet trekant/Likesida trekant

d) –

A 84 100°

A 85 60°

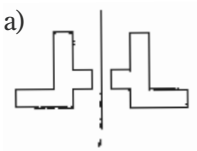
A 86

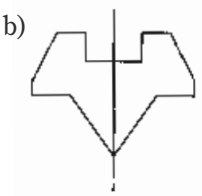
a) 45°, 45° og 90°

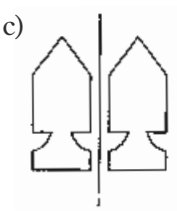
b) –

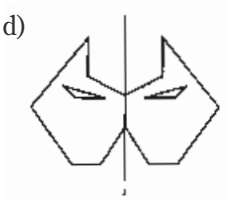
A 87 –

A 88

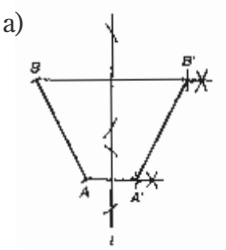
a) 

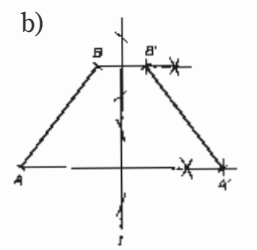
b) 

c) 

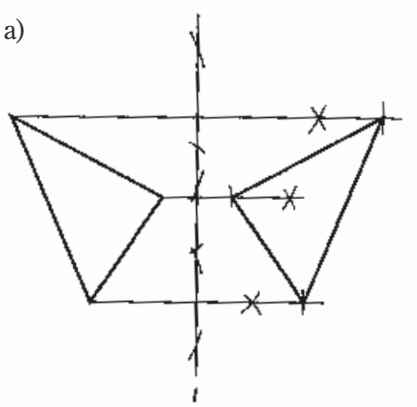
d) 

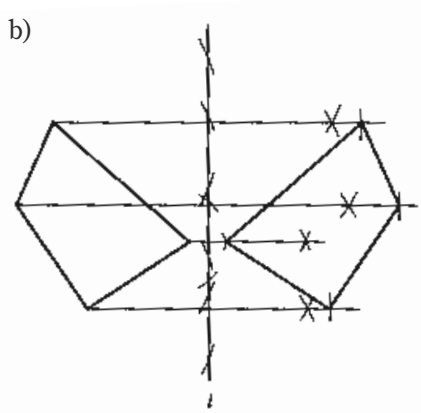
A 89

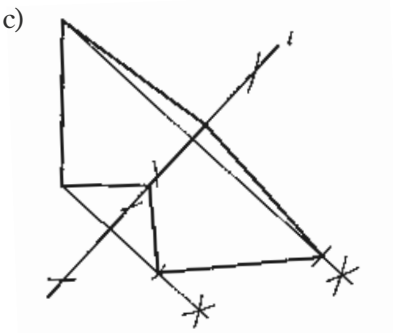
a) 

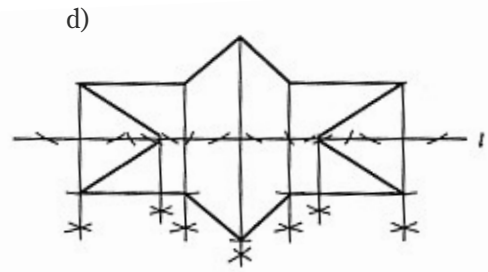
b) 

A 90

a) 

b) 

c) 

d) 

A 91

–

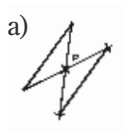
A 92

a) 4 b) 1 c) 8 d) Uendelig mange/Uendeleg mange

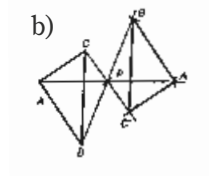
e) 4 f) 4

A 93

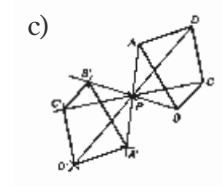
a)



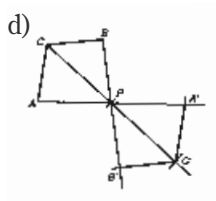
b)



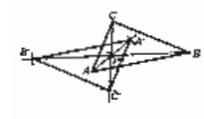
c)



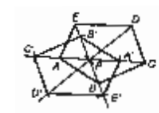
d)



e)

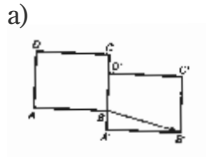


f)

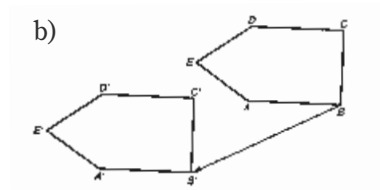


A 94

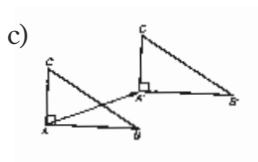
a)



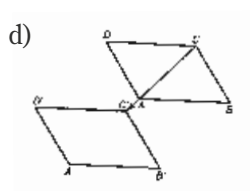
b)



c)



d)



A 95

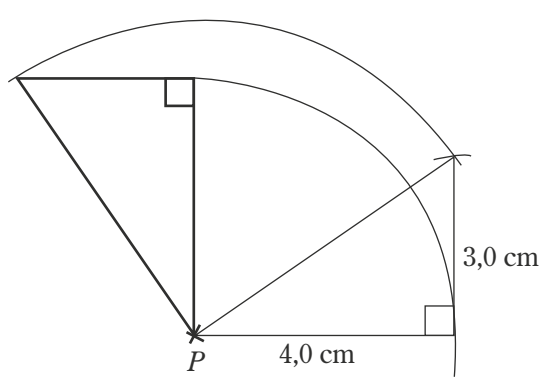
a) Figuren gjentar seg selv ved dreining. b) 90°

A 96

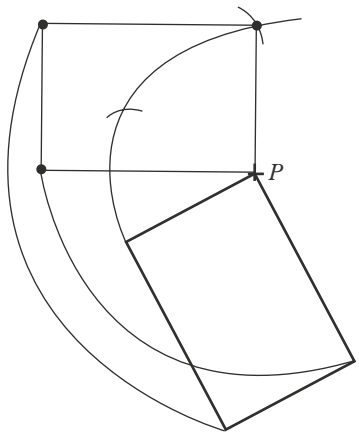
a) Linjen dekker hverandre med jevne mellomrom når du dreier om *P*.
b) 45°

A 97

a)

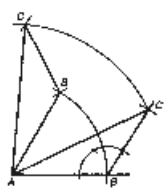


b)



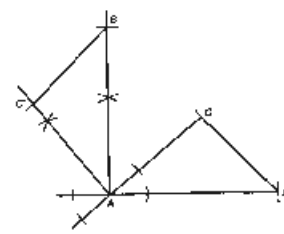
A 98

a) b)



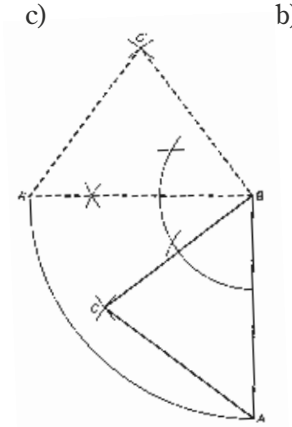
A 99

For eksempel:



A 100

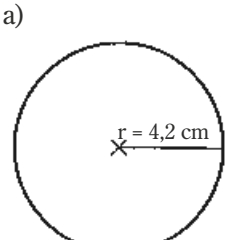
a) c)



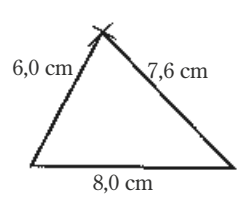
b) Trekanten er likebeint

A 101

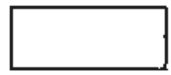
a)

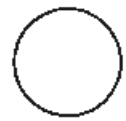


b)



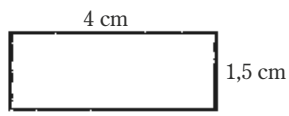
A 102

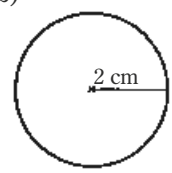
a) 

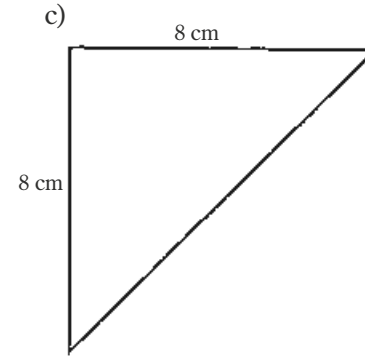
b) 

c) og d) Halver lengdene på figuren.

A 103

a) 

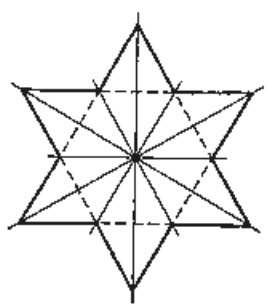
b) 

c) 

d) Femdobl lengdene på figuren.

A 104

a) 24 cm b) c) d) ≈ 83 cm²



A 105

a) 4,5 cm b) 28,26 cm² c) 63,585 cm²
d) 2,25 ganger større/2,25 gonger større

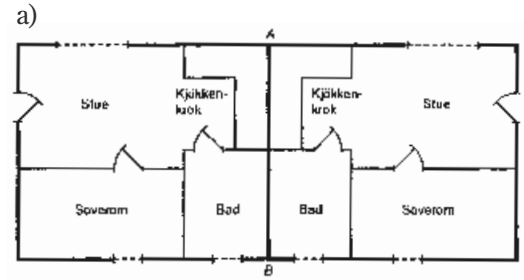
A 106

a) 1 km b) 2,9 km c) 5,2 km d) 6,0 km

A 107

a) 1 km² b) 3,1 km c) 1,3 km d) 3,7 km

A 108

a) 

b) ≈ 23,4 m²
c) ≈ 4,2 m²
d) ≈ 28 %

A 109 –

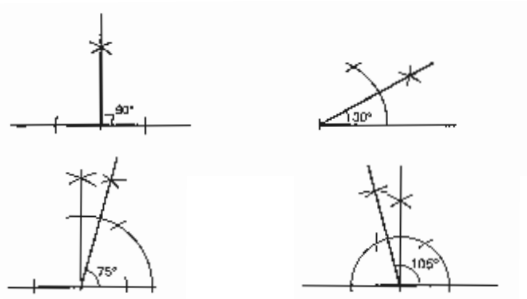
A 110 120 cm²

A 111 16 m²

A 112 1 : 12

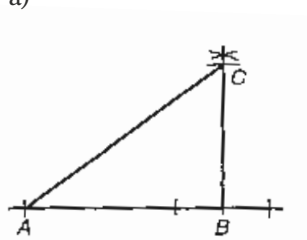
A 113 1 : 50

A 114

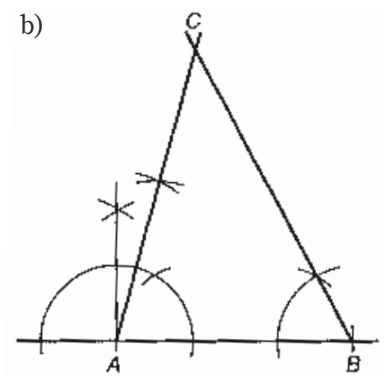


A 115

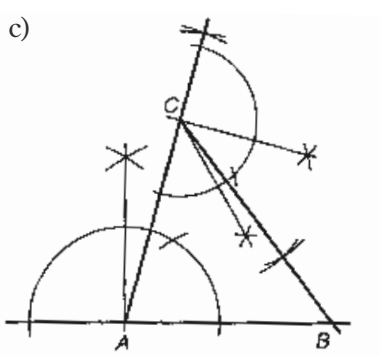
a)



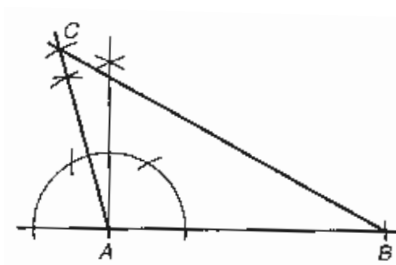
b)



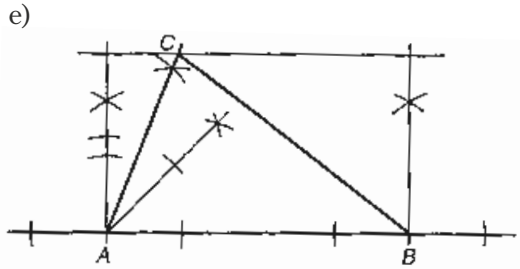
c)



d)

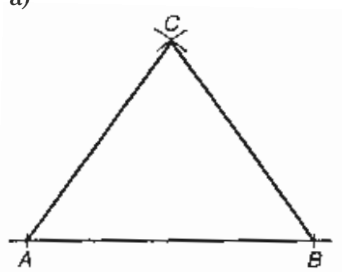


e)

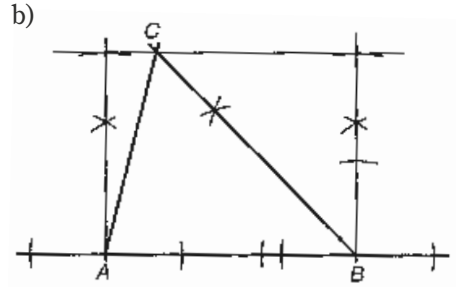


A 116

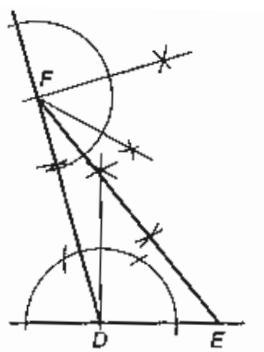
a)



b)

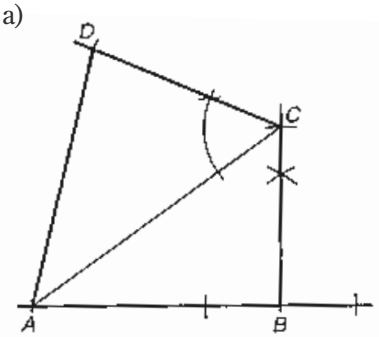


c)

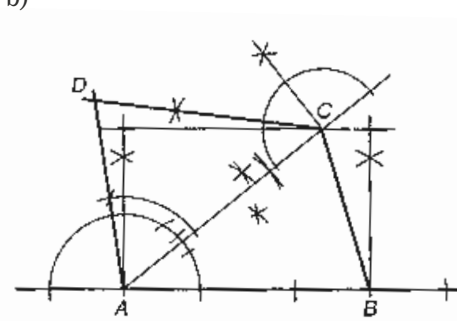


A 117

a)



b)



A 118

a) Rettvinklet trekant/Rett vinkla trekant $\angle C = 40^\circ$
b) Likesidet trekant/Likesida trekant $\angle C = 60^\circ$
c) Likebeint trekant $\angle C = 40^\circ$
d) Likesidet trekant/Likesida trekant $\angle A = \angle B = \angle C = 60^\circ$
e) Rettvinklet, likebeint trekant/Rettvinkla, likebeint trekant $\angle B = \angle C = 45^\circ$

A 119

a) $x \approx 7{,}2$ cm b) $x = 7{,}9$ cm

A 120

a) $x \approx 6{,}2$ cm b) $x = 6{,}5$ cm

A 121

a) $x \approx 9{,}6$ cm b) $x \approx 7{,}9$ cm c) $x = 0{,}6$ cm d) $x \approx 5{,}7$ cm
e) $x \approx 6{,}9$ cm f) $x \approx 4{,}6$ cm

A 122

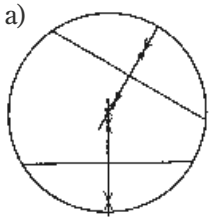
a) $x \approx 3{,}5$ cm b) $x \approx 2{,}9$ cm

A 123

a) og d)

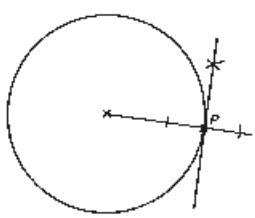
A 124

a)



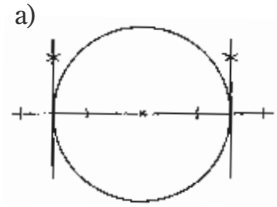
b) Midtnormalene går gjennom sentrum i sirkelen./
Midtnormalane går gjennom sentrum i sirkelen.

A 125



A 126

a)

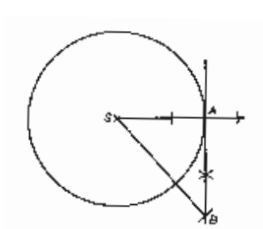


b) Tangentene er parallelle./Tangentane er parallelle.

A 127

A 128

a) b)



c) Areal $\approx 7{,}8$ cm^2
Omkrets/Omkrins $\approx 14{,}2$ cm

A 129

a) Vinklene er parvis like. b) Lengden på ensliggende sider.

A 130

a) $\Delta ABC \sim \Delta AEB$ fordi
$\angle ABC = AEB = 90^o$
$\angle A$ er felles i begge trekantene/er felles i begge trekantane
Siden to av vinklene er parvis like store, er også det tredje paret like stort (vinkelsummen i en trekant er alltid 180^o). Konklusjon: Fordi vinklene i trekantene er parvis like store, er trekantene formlike./Sidan to av vinklane er parvis like store, er også det tredje paret like stort (vinkelsummen i ein trekant er alltid 180^o). Konklusjon: Fordi vinklane i trekantane er parvis like store, er trekantane formlike.

b) $\Delta BEC \sim \Delta ABC$ fordi
$\angle CEB = \angle CBA = 90^o$
$\angle C$ er felles i begge trekantene/er felles i begge trekantane

A 131

a) $\Delta ABC \sim \Delta AFB$ fordi
$\angle ABC = \angle AFB = 90^o$
$\angle BAF$ er felles i begge trekantene/er felles i begge trekantane

b) $\Delta ACD \sim \Delta ADE$ fordi
$\angle ADC = \angle AED = 90^o$
$\angle DAC$ er felles i begge trekantene/er felles i begge trekantane

c) 6

A 132

a) Supplementvinklene til $\angle a$ og $\angle b$ har høyre vinkelbein felles.
De er dermed samsvarende.

b) l og m må være parallelle.

A 133

a) –

b) $\angle a = \angle d$ og $\angle b = \angle c$
$\angle e = \angle h$ og $\angle f = \angle g$
Toppvinkler

c) Samsvarende vikler:
$\angle b$ og $\angle f$, $\angle d$ og $\angle h$, $\angle c$ og $\angle g$, $\angle a$ og $\angle e$

d) –

e) Vi får to like samsvarende vinkler.

A 134

a) De er toppvinkler./Dei er toppvinklar.

b) De er samsvarende vinkler ved parallelle linjer./Dei er samsvarande vinklar ved parallelle linjer.

c) De er samsvarende vinkler ved parallelle linjer./Dei er samsvarande vinklar ved parallelle linjer.

d) $\Delta CDM \sim \Delta ABM$

A 135

a) $\Delta ABC \sim \Delta DEC$ fordi
$\angle BAC = \angle EDC$, samsvarende vinkler ved parallelle linjer er like store/samsvarande vinklar ved parallelle linjer er like store
$\angle BCA = \angle ECD$, felles i de to trekantene/felles i dei to trekantane

b) $\Delta BGC \sim \Delta EFC$ fordi
$\angle BGC = \angle EFC = 90^\circ$
$\angle BCG = \angle ECF$, felles i de to trekantene/felles i dei to trekantane

c) $\Delta AGC \sim \Delta DFC$ fordi
$\angle AGC = \angle DFC = 90^\circ$
$\angle ACG = \angle DCF$, felles i de to trekantene/felles i dei to trekantane

A 136

$\Delta ABM \sim \Delta DCM$ fordi
$\angle AMB = \angle DMC$, toppvinkler og like store/toppvinklar og like store
$\angle ABM = \angle CDM$, samsvarende vinkler ved parallelle linjer/samsvarande vinklar ved parallelle linjer

A 137

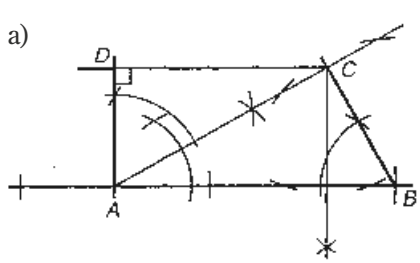
a) 8,0 cm siden trekantene er formlike b) 2 : 1 c) 1 : 2

A 138

a) $x = 12{,}0$ cm b) $x = 3{,}0$ cm

A 139

a)



b) ΔABC har vinkler lik/har vinklar lik 30°, 60° og 90°. BC = $\frac{7{,}4}{2}$ = 3,7 cm

c) $AC \approx 6{,}4$ cm d) $\angle D = 90^\circ$

e) $\Delta ABC \sim \Delta CAD$ fordi
$\angle ADC = \angle ACB = 90^\circ$
$\angle BAC = \angle DCA$, samsvarende vinkler ved parallelle linjer er like store/samsvarande vinklar ved parallelle linjer er like store

f) $AD = \frac{1}{2}AC \rightarrow 3{,}2$ cm g) Arealet $\approx 20{,}6$ cm^2

$CD \approx 5{,}5$ cm

A 140

a) $\Delta ABC \sim \Delta CBD$ fordi
$\angle ACB = \angle BDC = 90^o$
$\angle B$ er felles i de to trekantene/er felles i dei to trekantane

b) $AB = 10{,}0$ cm
$AD = 3{,}6$ cm
$BD = 6{,}4$ cm
$CD = 4{,}8$ cm

c) 24 cm^2

d) $AC = 6$ km, $BC = 8$ km, $CD = 4{,}8$ km, $AB = 10$ km

A 141

a) $\angle C = 40^o$ b) 12 m c) $DE \approx 4{,}2$ cm

d) $\Delta DEC \sim \Delta ABC$ fordi
$\angle ABC = \angle DEC = 90^o$
$\angle BAC = \angle EDC$, samsvarende vinkler ved parallelle linjer/samsvarande vinklar ved parallelle linjer

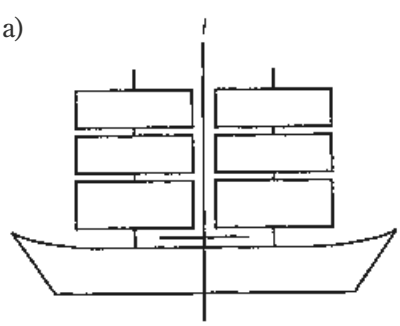
e) $BC = 7{,}1$ cm f) 85,2 m^2

A 142

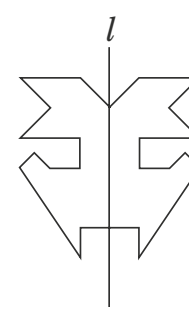
a) $\approx 37{,}7$ cm^2 b) $\approx 83{,}7$ cm^2 c) $\approx 7{,}9$ cm^2 d) $\approx 47{,}3$ cm^2

A 143

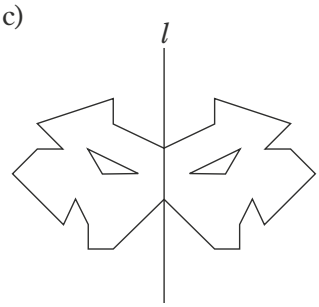
a)



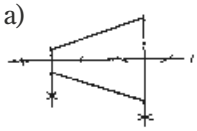
b)

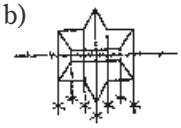


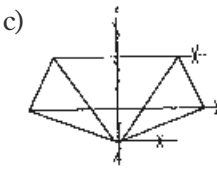
c)

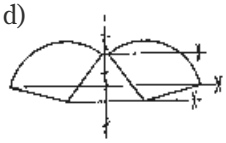


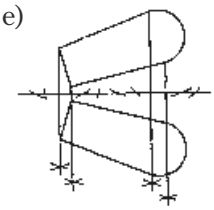
A 144

a) 

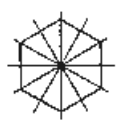
b) 

c) 

d) 

e) 

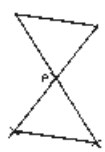
A 145

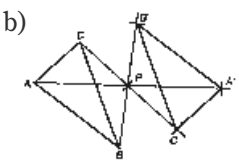
a) 

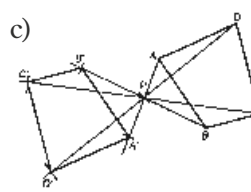
b) 

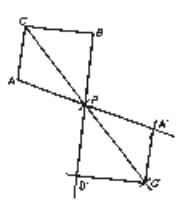
c) 

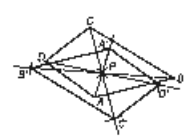
A 146

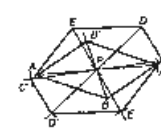
a) 

b) 

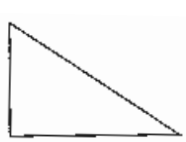
c) 

d) 

e) 

f) 

A 147

a) 

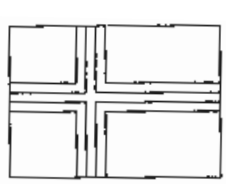
målene 3 ganger så store

b) 

målene like

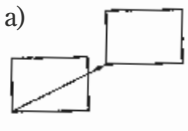
c) 

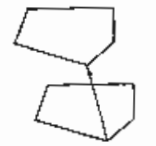
målene en halv gang så stor

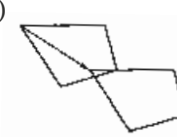
d) 

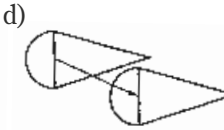
målene 5 ganger så store

A 148

a) 

b) 

c) 

d) 

A 149 1,2 m · 1,8 m

A 150 1 : 8

A 151 a) 300 cm^2 b) 9 ganger mindre

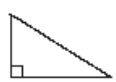
A 152 –

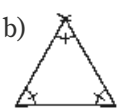
A 153 a) 39,25 cm^2 b) 157 m^2 c) 16 % d) 19 m^2 e) 12 %

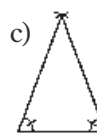
A 154 a) 1 km^2 b) ≈ 1,8 km c) ≈ 2,5 km d) ≈ 3,3 km

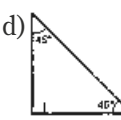
A 155 a) ≈ 6,7 km b) ≈ 2,7 km c) 60 m d) ≈ 17,8 km

A 156

a) 

b) 

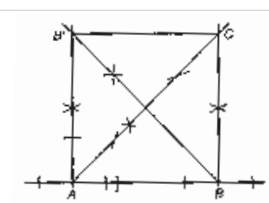
c) 

d) 

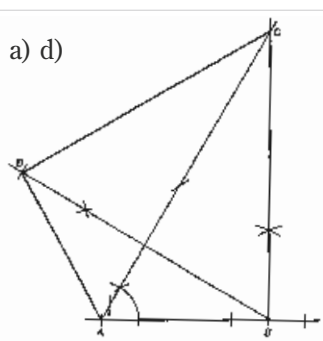
A 157 Nei. Alle vinklene er like store, og når vinkelsummen i en trekant er 180°, blir alle vinklene 60°./Nei. Alle vinklane er like store, og når vinkelsummen i ein trekant er 180°, blir alle vinklane 60°.

A 158 a) $x \approx 4{,}4$ cm b) $x \approx 2{,}2$ cm c) $x \approx 3{,}2$ cm d) katet ≈ 3,5 cm
hypotenus ≈ 7,0 cm
e) $s \approx 4{,}2$ cm f) Begge katetene ≈ 3,7 cm

A 159 a) b)
c) Areal ≈ 42,3 cm^2
Omkrets/Omkrins: 26 cm



A 160

a) d) 

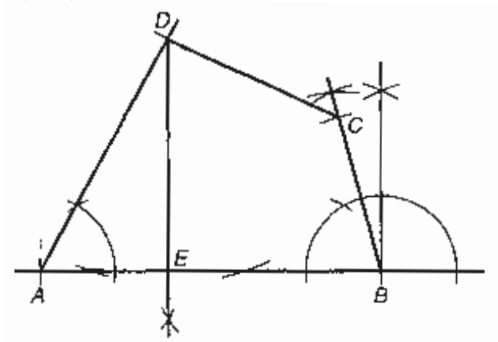
b) Satte av $AB = 9$ cm. Konstruerte $\angle A = 60°$ og $\angle B = 90°$. Punkt C ligger i skjæringspunktet./Sette av $AB = 9$ cm. Konstruerte $\angle A = 60°$ og $\angle B = 90°$. Punkt C ligg i skjeringspunktet.

c) $BC \approx 15{,}6$ cm $AC = 18$ cm

e) Areal ≈ 140,4 cm^2

A 161

a) c)

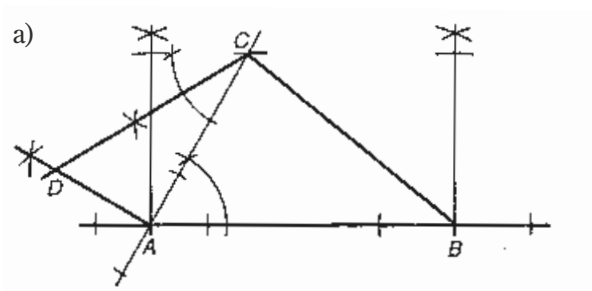


d) $AE = 3{,}5$ cm, $DE \approx 6{,}1$ cm

b) Satte av $AB = 9{,}0$ cm. Konstruerte $\angle BAD = 60^\circ$ og satte av $AD = 7{,}0$ cm. Konstruerte $\angle ABC = 75^\circ$ og satte av $BC = 4{,}2$ cm. Trakk linjestykket CD./ Sette av $AB = 9{,}0$ cm. Konstruerte $\angle BAD = 60^\circ$ og sette av $AD = 7{,}0$ cm. Konstruerte $\angle ABC = 75^\circ$ og sette av $BC = 4{,}2$ cm. Drog linjestykket CD.

A 162

a)

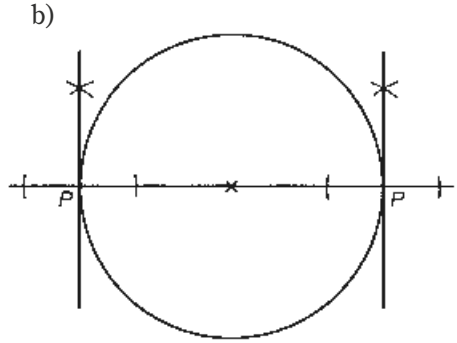


b) Satte av $AB = 8{,}0$ cm. Konstruerte $\angle BAC = 60^\circ$. Konstruerte en parallell til AB i avstanden 4,5 cm. Punktet C ligger i skjæringspunktet mellom parallellen og det venstre vinkelbeinet til $\angle BAC$. Trakk linjen BC. Konstruerte $\angle CAD = 90^\circ$. Konstruerte $\angle ACD = 30^\circ$./Sette av $AB = 8{,}0$ cm. Konstruerte $\angle BAC = 60^\circ$. Konstruerte ein parallell til AB i avstanden 4,5 cm. Punktet C ligg i skjeringspunktet mellom parallellen og det venstre vinkelbeinet til $\angle BAC$. Drog linja BC. Konstruerte $\angle CAD = 90^\circ$. Konstruerte $\angle ACD = 30^\circ$.

c) Areal $\approx 25{,}8$ cm^2
Omkrets/Omkrins $\approx 24{,}0$ cm

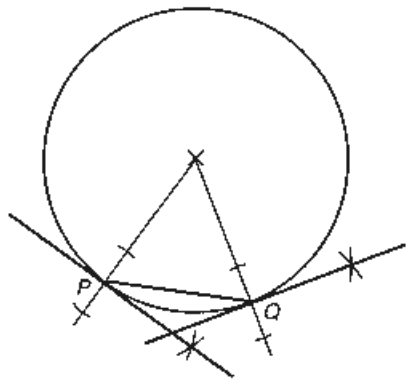
A 163

a) Ja. b)

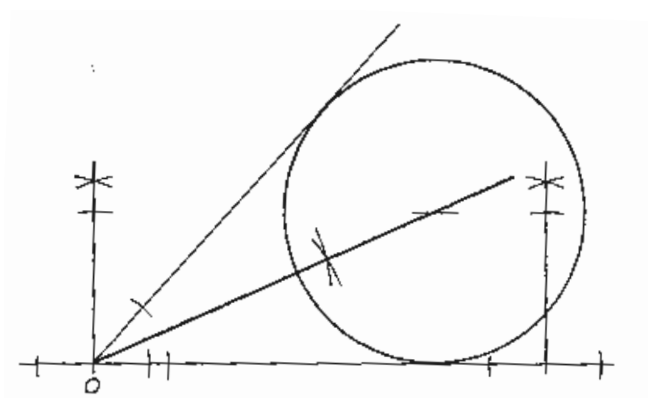


c) Tangentene står normalt på diameteren, og derfor er de parallelle./ Tangentane står normalt på diameteren, og derfor er dei parallelle.

A 164

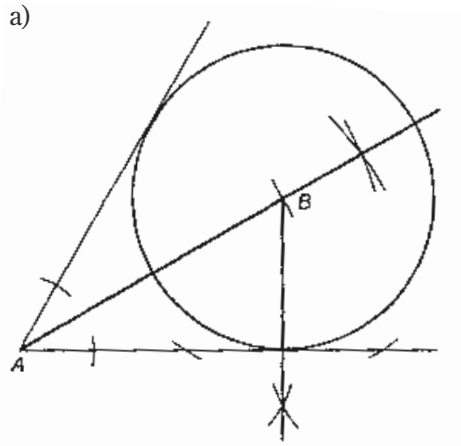


A 165



A 166

a)



b) $r = 4{,}0$ cm

A 167

a) $\approx 1{,}4$ cm

b) $\approx 2{,}8$ cm

c) diagonalen = $a\sqrt{2}$

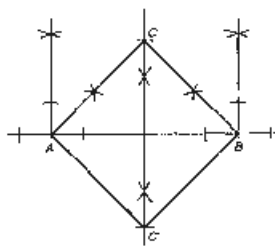
d) Alle diagonalene i kvadrater blir lik sidelengden multiplisert med $\sqrt{2}$./
Alle diagonalane i kvadrat blir lik sidelengda multiplisert med $\sqrt{2}$.

A 168

$\approx 6{,}2\ \text{cm}^2$

A 169

a) d)



ΔABC er en rettvinklet, likebeint trekant./
ΔABC er en rettvinkla, likebeint trekant.

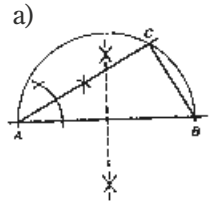
b) $h = 4{,}3$ cm

c) $A \approx 18{,}5\ \text{cm}^2$

e) Firkant $ACBC$ er et kvadrat./Firkant $ACBC$ er eit kvadrat.

A 170

a)



Dette er en trekant med vinkler på 30°, 60° og 90°. Vi setter av AB lik 8,0 cm og konstruerer $\angle A = 30°$ og $\angle B = 60°$. Da får vi $\angle C = 90°$./Dette er ein trekant med vinklar på 30°, 60° og 90°. Vi set av AB lik 8,0 cm og konstruerer $\angle A = 30°$ og $\angle B = 60°$. Da får vi $\angle C = 90°$.

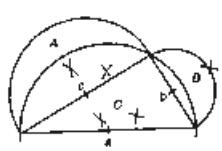
b) Vi kan også starte med å konstruere $\angle C = 90°$. Fordi dette er en trekant med vinkler på 30°, 60° og 90°, er BC halvparten av AC, altså 4,0 cm. Da kan vi sette av $CB = 4{,}0$ cm og $AB = 8{,}0$ cm./Vi kan også starte med å konstruere $\angle C = 90°$. Fordi dette er ein trekant med vinklar på 30°, 60° og 90°, er BC halvparten av AC, altså 4,0 cm. Da kan vi setje av $CB = 4{,}0$ cm og $AB = 8{,}0$ cm.

A 171

Den lengste stanga er 9 m./Den lengste stonga er 9 m.

A 172

a)



Vi skal bevise./Vi skal prove: A + B = C

Bevis/Prov:

$$A + B = \frac{\pi \cdot \frac{c}{2} \cdot \frac{c}{2}}{2} + \frac{\pi \cdot \frac{b}{2} \cdot \frac{b}{2}}{2} + \frac{bc}{2} - \frac{\pi \cdot \frac{a}{2} \cdot \frac{a}{2}}{2}$$

$$A + B = \frac{\pi c^2}{8} + \frac{\pi b^2}{8} + \frac{bc}{8} - \frac{\pi a^2}{8}$$

$$A + B = \frac{\pi}{8}(c^2 + b^2 - a^2) + \frac{bc}{2}$$

$$A + B = \frac{\pi}{8}(c^2 + b^2 - c^2 - b^2) + \frac{bc}{2}$$

$$A + B = \frac{bc}{2} = C$$

A 173

a) Vinklene er parvis like.

b) Lengden på samsvarende sider er ulikt.

A 174

a) $\Delta ABC \sim \Delta ABE$ fordi
$\angle ABC = AEB = 90^o$
A er felles i begge trekantene/er felles i begge trekantane
Siden to av vinklene er parvis like store, er også det tredje paret like stort (vinkelsummen i en trekant er alltid 180^o). Konklusjon: Fordi vinklene i trekantene er parvis like store, er trekantene formlike./Sidan to av vinklane er parvis like store, er også det tredje paret like stort (vinkelsummen i ein trekant er alltid 180^o). Konklusjon: Fordi vinklane i trekantane er parvis like store, er trekantane formlike.

b) $\Delta BEC \sim \Delta ABC$ fordi
$\angle CEB = \angle CBA = 90^o$
$\angle C$ er felles i begge trekantene/er felles i begge trekantane

A 175

a) $\Delta ABC \sim \Delta AFB$ fordi
$\angle ABC = \angle AFB = 90^o$
$\angle BAF$ er felles i begge trekantene/er felles i begge trekantane

b) $\Delta ACD \sim \Delta ADE$ fordi
$\angle ADC = \angle AED = 90^o$
$\angle DAC$ er felles i begge trekantene/er felles i begge trekantane

c) 6

A 176

a) Supplementvinkelen til $\angle a$ og $\angle b$ er samsvarende./Supplementvinkelen til $\angle a$ og $\angle b$ er samsvarande.

b) L må være parallell med m.

A 177

a) –

b) $\angle a = \angle d = \angle e = \angle h$
$\angle b = \angle c = \angle f = \angle g$

c) $\angle a$ og $\angle e$ er samsvarende
$\angle b$ og $\angle f$ er samsvarende
$\angle c$ og $\angle g$ er samsvarende
$\angle d$ og $\angle h$ er samsvarende

A 178

a) De er toppvinkler./Dei er toppvinklar.

b) De er samsvarende vinkler ved parallelle linjer./Dei er samsvarande vinklar ved parallelle linjer.

c) De er samsvarende vinkler ved parallelle linjer./Dei er samsvarande vinklar ved parallelle linjer.

d) $\Delta CDM \sim \Delta ABM$

A 179

a) $\Delta ABC \sim \Delta DEC$ fordi
$\angle BAC = \angle EDC$, samsvarende vinkler ved parallelle linjer er like store/ samsvarande vinklar ved parallelle linjer er like store
$\angle BCA = \angle ECD$, felles i de to trekantene/felles i dei to trekantane

b) $\Delta BGC \sim \Delta EFC$ fordi
$\angle BGC = \angle EFC = 90^\circ$
$\angle BCG = \angle ECF$, felles i de to trekantene/felles i dei to trekantane

c) $\Delta AGC \sim \Delta DFC$ fordi
$\angle AGC = \angle DFC = 90^\circ$
$\angle ACG = \angle DCF$, felles i de to trekantene/felles i dei to trekantane

A 180

$\Delta ABM \sim \Delta DMC$ fordi
$\angle AMB = \angle DMC$, toppvinkler og like store/toppvinklar og like store
$\angle ABM = \angle CDM$, samsvarende vinkler ved parallelle linjer/samsvarande vinklar ved parallelle linjer

A 181

a) $DF = 8{,}0$ cm fordi trekantene er formlike og DE er dobbelt så lang som AB

b) 2 : 1 c) 1 : 2

A 182

a) $x = 12{,}0$ cm b) $x = 3{,}0$ cm

A 183

a) Likebeint trekant b) $BE = 2{,}5$ cm, $AE \approx 4{,}3$ cm

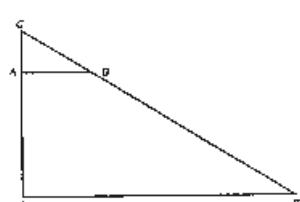
c) $AB = BC = 0{,}5$ cm
Fordi trekantene er likebeinte, er $\angle BCE = \angle BAE = 30^\circ$/Fordi trekantane er likebeinte, er $\angle BCE = \angle BAE = 30^\circ$

d) $\Delta ABE \sim \Delta ACD$ fordi
$\angle ADC = \angle AEB = 90^\circ$
$\angle BAC = \angle ACD$ samsvarende vinkler ved parallelle linjer er like store/ samsvarande vinklar ved parallelle linjer er like store

e) $AD \approx 4{,}3$ cm, $CD \approx 7{,}4$ cm f) Trapes g) A $\approx 26{,}7$ cm^2

A 184

a)



b) $BC \approx 16{,}7$ cm
$A'B' = 3{,}6$ cm, $A'C' = 2{,}1$ cm, $B'C' \approx 4{,}2$ cm

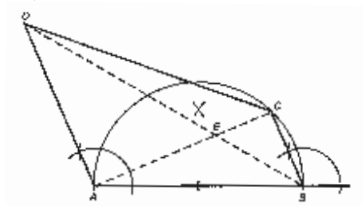
c) Arealet av $\Delta ABC \approx 60{,}5$ cm^2
Arealet av $\Delta A'B'C \approx 3{,}8$ cm^2
$\frac{\Delta A'B'C}{\Delta ABC} \approx 0{,}06$

d) –

$\frac{\Delta A'B'C}{\Delta ABC} = \frac{1}{4}$. Omkretsen reduseres i samme forhold som lengden av sidene./ Omkrinsen blir redusert i same forhold som lengda av sidene.

A 185

a)



b) $BE = 5{,}0$ cm $\quad AE \approx 7{,}2$ cm

c) $\angle BEC = \angle AED$ (toppvinkler/toppvinklar)

$\angle DBC = \angle BDA$ } (samsvarende vinkler

$\angle BCA = \angle CAD = 90°$ } ved parallelle linjer)

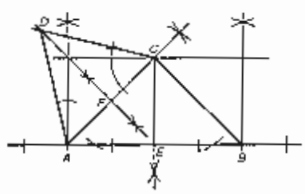
Da er $\Delta ADE \sim \Delta CBE$

d) $AD \approx 9{,}6$ cm $\quad BD = 17$ cm

e) Arealet $\approx 69{,}4$ cm^2

A 186

a) b)



a) Arealet $= 16$ cm^2

c) ΔAEC er en rettvinklet, likebeint trekant fordi $AE = EC$./ΔAEC er ein rettvinkla, likebeint trekant fordi $AE = EC$.

d) $AC \approx 5{,}7$ cm

e) ΔACD er en likesidet trekant, og alle sidene er like lange. Derfor blir $CD = 2CF$ fordi vinklene i $\Delta FCD = 30°$, $60°$ og $90°$./ΔACD er ein likesida trekant, og alle sidene er like lange. Derfor blir $CD = 2CF$ fordi vinklane i $\Delta FCD = 30°$, $60°$ og $90°$. $FD \approx 4{,}9$ cm

A 187

a) $BD \approx 5{,}3$ cm

b) $\Delta ABC \sim \Delta ADC$ fordi

$\angle ACB = \angle ADC = 90°$

$\angle A$ er felles i de to trekantene/er felles i dei to trekantane

c) $AC \approx 9{,}1$ cm

d) $AD \approx 6{,}8$ cm

e) Arealet er $\approx 36{,}3$ cm^2

A 188

a) $\Delta ABC \sim \Delta ACD$ fordi

$\angle ACB = \angle ADC = 90°$

$\angle A$ er felles i de to trekantene/er felles i dei to trekantane

b) $\Delta ADC \sim \Delta CDB$ fordi

$\angle ADC = \angle CDB = 90°$

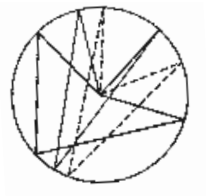
Når trekantene ABC og ACD er formlike, må også ΔCDB være formlik med ΔABC fordi $\angle B$ er felles i de to trekantene./Når trekantene ABC og ACD er formlike, må også ΔCDB vere formlik med ΔABC fordi $\angle B$ er felles i dei to trekantane.

c) $DC = 3{,}0$ cm

d) $BC \approx 3{,}8$ cm, $BD \approx 2{,}3$ cm

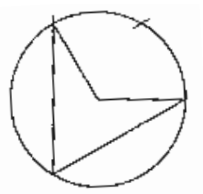
e) Arealet $\approx 9{,}5$ cm^2

A 189



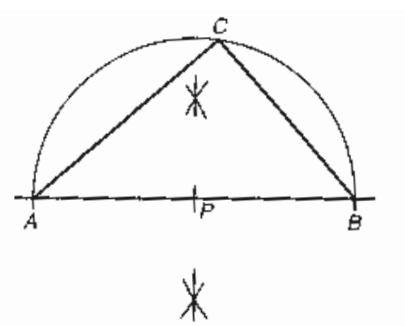
Sentralvinkelen er dobbelt så stor som periferivinkelen.

A 190



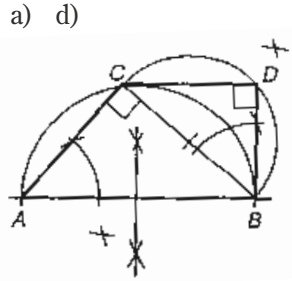
Periferivinkelen blir 60°.

A 191



A 192

a) d)



b) $BC \approx 4{,}5$ cm

c) Arealet $\approx 9{,}0$ cm^2

e) $\Delta BCD \sim \Delta ABC$ fordi
$\angle ACB = \angle BDC = 90^\circ$
$\angle CAB = \angle CBD$ gitt i oppgaven, dermed er de to trekantene formlike/gitt i oppgåva, dermed er dei to trekantane formlike

f) $BD \approx 3{,}0$ cm, $CD \approx 3{,}4$ cm

g) Omkretsen/Omkrinsen $\approx 16{,}4$ cm

A 193

a) Arealet = 13,5 cm^2

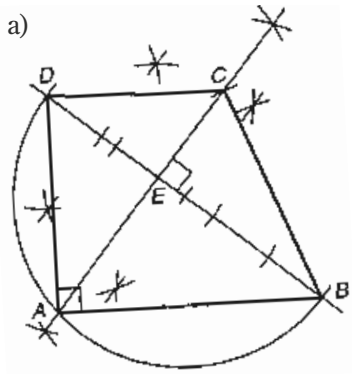
b) $AB = 7{,}5$ cm

c) $\Delta ABC \sim \Delta CBF$ fordi
$\angle ACB = \angle CFB = 90^\circ$
$\angle B$ er felles i de to trekantene/felles i dei to trekantane

d) $CF = 3{,}6$ cm

A 194

a)



Konstruerte første diagonalene AC og BD normalt på hverandre. Satte av avstanden $EC = 2{,}7$ cm og deretter $CD = 4{,}5$ cm. Halverte DE og satte av $\frac{1}{2}\,DE$ tre ganger på diagonalen BE. Halverte BD og konstruerte en halvsirkel. A ligger da på skjæringen med halvsirkelen og AC./ Konstruerte først diagonalane AC og BD normalt på kvarandre. Sette av avstanden $EC = 2{,}7$ cm og deretter $CD = 4{,}5$ cm. Halverte DE og sette av $\frac{1}{2}\,DE$ tre gonger på diagonalen BE. Halverte BD og konstruerte ein halvsirkel. A ligg da på skjeringa med halvsirkelen og AC.

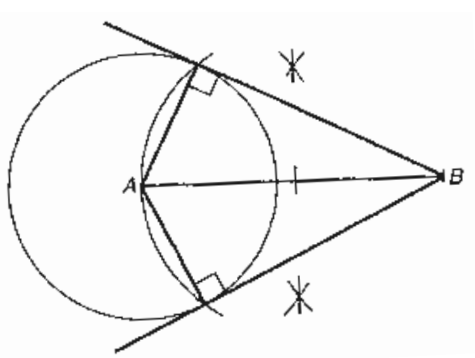
b) $DE = 3{,}6$ cm, $BC \approx 6{,}0$ cm, $BD \approx 9{,}0$ cm

c) $\Delta ABE \sim \Delta ADE$ fordi
$\angle BEA = \angle AED = \angle BAD = 90^\circ$
$\Delta ABD \sim \Delta AED$ fordi de har $\angle ADE$ felles/fordi dei har $\angle ADE$ felles
$\Delta ABD \sim \Delta AEB$ fordi de har $\angle ABE$ felles/fordi dei har $\angle ABE$ felles
ΔABE er da formlik med ΔADE

d) $AE \approx 4{,}4$ cm

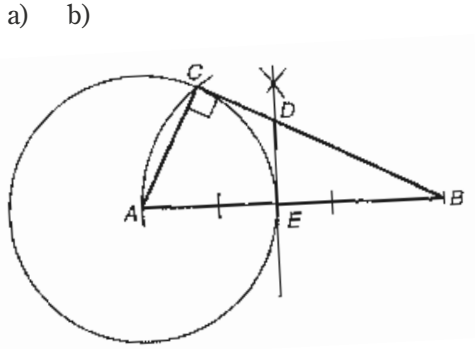
e) Arealet $\approx 32{,}0$ cm^2

A 195



A 196

a) b)



c) $\Delta ABC \sim \Delta DBE$ fordi
$\angle BED = \angle BCA = 90^\circ$
$\angle B$ er felles i de to trekantene/er felles i dei to trekantane
$BC \approx 6{,}9$ cm $DE \approx 2{,}3$ cm

d) Arealet $\approx 13{,}8$ cm^2

A 197

a) $A = 11{,}2\ \text{cm}^2$ b) $A = 63{,}8\ \text{cm}^2$

A 198

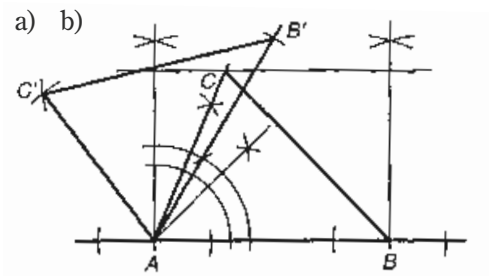
a) $O = 25{,}1\ \text{cm}$ b) $\approx \frac{2}{5}$ c) $\approx \frac{2}{5}$ d) $= 20{,}1\ \text{cm}^2$

A 199

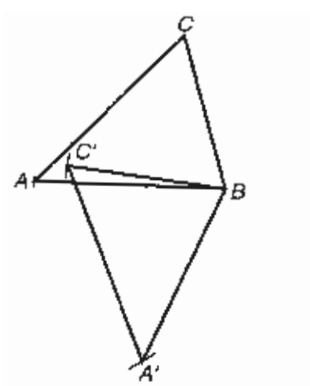
a) $A \approx 24{,}0\ \text{cm}^2$ b) $A \approx 24{,}0\ \text{cm}^2$ c) $A \approx 479{,}3\ \text{cm}^2$

A 200

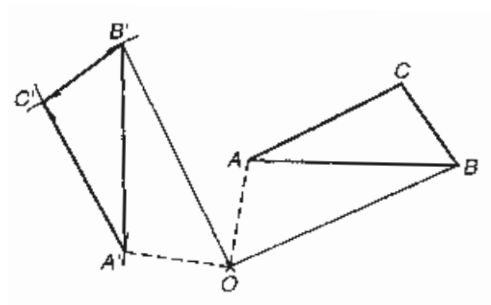
a) b)



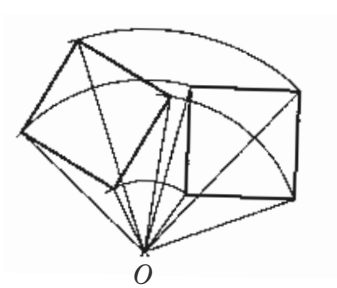
A 201



A 202



A 203

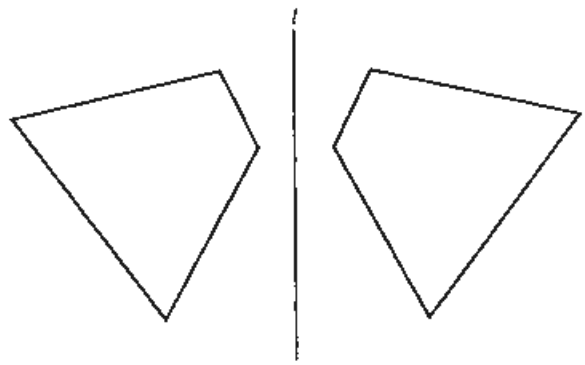


A 204

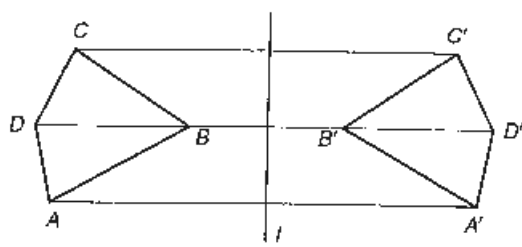
a) Sentrum i sirkelen.
b) Skjæringspunktet mellom diagonalene./Skjeringspunktet mellom diagonalane.
c) Skjæringspunktet mellom diagonalene./Skjeringspunktet mellom diagonalane.

PRØV DEG SELV

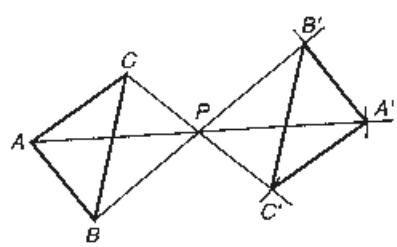
PA 1



PA 2

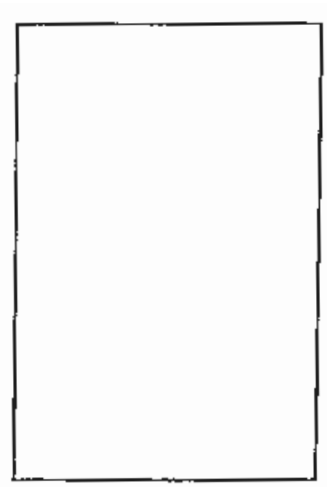


PA 3

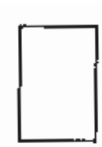


PA 4

a)



b)



Rutestørrelsen er 0,5 cm · 0,5 cm./
Rutestorleiken er 0,5 cm · 0,5 cm

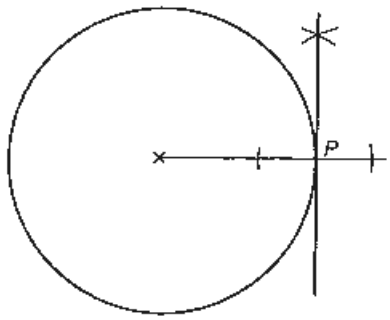
PA 5

a) 500 m b) 3250 m

PA 6

a) ≈ 31,2 cm^2 b) ≈ 12 471 m^2

PA 7

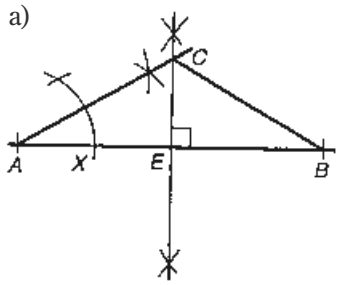


PA 8

– Bruk formlikhet.

PA 9

a)



b) Likebeint trekant fordi AC = BC.

c) $\angle C = 120^o$

d) Dette er en trekant med vinkler på 30º, 60º og 90º, og da er hypotenusen dobbelt så lang som den korteste kateten./Dette er ein trekant med vinklar på 30º, 60º, og 90º, og da er hypotenusen dobbelt så lang som den kortaste kateten.

e) Vi bruker den pytagoreiske lærsetningen./Vi bruker den pytagoreiske læresetninga:
$(AC)^2 = (CE)^2 + (AE)^2$
$(2x)^2 = x^2 + 4^2$
$4x^2 = x^2 + 16$

f) $AC \approx 4{,}6$ cm

g) Arealet ≈ 9,2 cm^2

PA 10

a) $\Delta ABC \sim \Delta DBA$ fordi
$\angle BAC = \angle ADB = 90^o$
$\angle B$ er felles i de to trekantene/er felles i dei to trekantane

b) $BC \approx 6{,}3$ cm $AC \approx 3{,}8$ cm

c) Arealet av $\Delta ABC \approx 9{,}5$ cm^2
Arealet av $\Delta ABD = 6{,}0$ cm^2

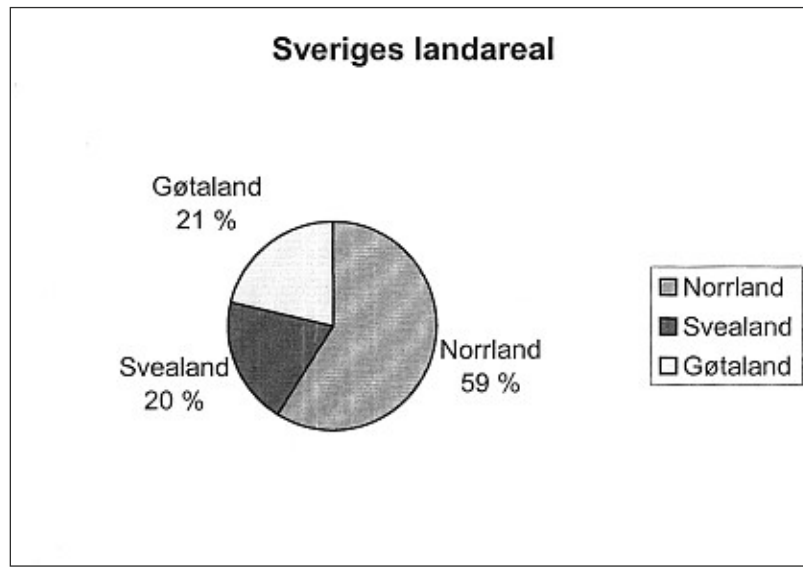
PA 11

Arealet ≈ 24,0 cm^2

LANDOPPGAVE: SVERIGE

LA 1

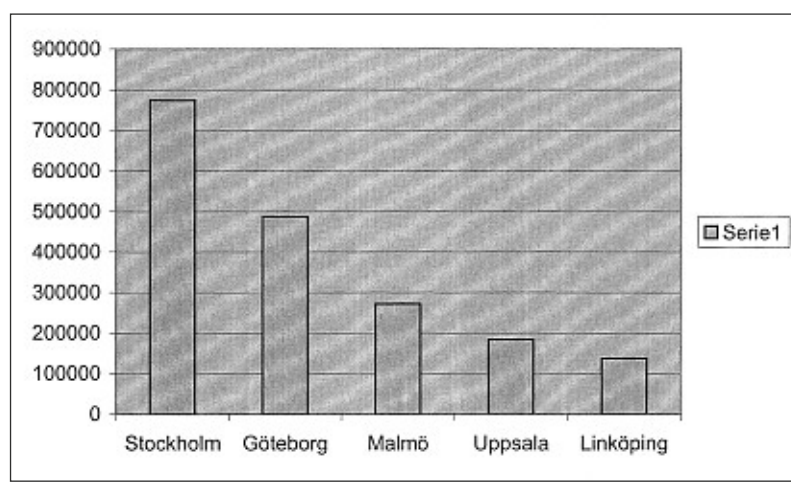
a)



b) Götaland 4,4 millioner Svealand 3,5 millioner Norrland 1,3 millioner

LA 2

a)



b) 1 855 000 c) 20,4 % d) 59 %

LA 3

a) 25 år b) 487 år (i 2008) c) 1 312 572 km d) ca. 33 ganger
e) ≈ 3,7 % f) ≈ 24,4 km/t

LA 4

e) 90,9 % f) $1{,}32 \cdot 10^7$ tonn

LA 5

a) 1826 b) 2 timer 12 min c) 1889 d) –

LA 6

a) 60 b) 161 000

LA 7

75 g margarin
3 dl melk
3/4 pk gjær
3/4 dl sukker
7,5 dl hvetemel
1,5 ts

LA 8

a) 42,75 km/t b) 11,9 m/s

LA 9

5,98 millioner NOK

LA 10

7,5 dager

LA 11

31 400 m^2 ≈ 4 fotballbaner

LA 12

a) ≈ 28 m b) ≈ 10 m

LA 13

1560 m

LA 14

6 à 2,50 kr 3 à 1,80 kr

LA 15

a) $d_1 = \frac{2A}{d_2}$ b) $d_1 = 7$ cm

FASIT TIL KAPITTEL B
TALL OG ALGEBRA

B 1

a) $13a$ b) $4a$ c) $8a - 2b$ d) $3a + 5b$
e) $9a + 3b - c$ f) $a + 12$ g) $a + 2b + 1$ h) $7a - 10b - 5$

B 2

a) $7x + 3$ b) $3x - 3$ c) $3x + 3$ d) $14a + 14b$
e) $34a + 10b + 11c$ f) $9 - 9a$

B 3

$15x + 3$ er riktig svar.
Minus og minus gir pluss. Ola endret ikke fortegnet da han løste opp den siste parentesen./
$15x + 3$ er rett svar.
Minus og minus gir pluss. Ola endra ikkje forteiknet da han løyste opp den siste parentesen.

B 4

a) $5a + 15$ b) $8a + 12$ c) $3x + 30$ d) $40a + 64$
e) $8a - 12b$ f) $15x - 6y$ g) $18b - 36c$ h) $-8x - 12$
i) $-8a + 4$ j) $-28x + 14y$ k) $-10z^2 + 15z$ l) $-16a^2 + 24ab$

B 5

a) $5x + 15$ b) $3x - 15$ c) $-2x - 6$ d) $-3x + 9$
e) x^2 f) $2x^2$ g) $2x^2 + 10x$ h) $6x^2 - 8x$
i) $5a^2 + 15a$ j) $14g^2 + 28g$ k) $-2a^2 - 8a$ l) $5a^2 - 35a$
m) $6x^2 + 10x$ n) $8a^2 + 4ab$ o) $-ba^2b - 9ab$

B 6

a) $x^2 + 9x + 20$ b) $x^2 + 8x + 12$ c) $a^2 + 12a + 32$
d) $y^2 + 12y + 27$ e) $x^2 + 4x + 3$ f) $x^2 + 7x + 12$

B 7

a) $6x^2 + 22x + 20$ b) $2x^2 + 5x + 3$ c) $4x^2 + 13x + 3$
d) $18x^2 + 18x + 4$ e) $10x^2 + 27x + 18$ f) $6x^2 + 11x + 4$
g) $63x^2 + 52x + 5$ h) $3x^2 + 46x + 120$

B 8

a) $x^2 - x - 2$ b) $2x^2 + 3x - 2$ c) $4x^2 + 11x - 3$
d) $2x^2 + 6x - 20$ e) $5x^2 - 34x - 7$ f) $7x^2 - 61x - 18$

B 9

a) $2x^2 + x - 3$ b) $x^2 - x - 12$ c) $x^2 + 2x - 15$
d) $15x^2 - 7x - 2$ e) $21x^2 - x - 2$ f) $6x^2 - 50x - 36$

B 10

a) $x^2 - 3x + 2$ b) $x^2 - 10x + 24$ c) $x^2 - 17x + 72$ d) $x^2 - 9x + 14$
e) $15x^2 - 13x + 2$ f) $4x^2 - 13x + 10$ g) $48x^2 - 38x + 5$ h) $4x^2 - 12x + 9$
i) $25x^2 - 20x + 4$ j) $63x^2 - 41x + 6$

B 11

a) $15x^2 - 39x - 18$ b) $56x^2 + 18x - 8$ c) $6x^2 - 26x + 28$ d) $x^2 + 11x + 24$

B 12

Fortegnet foran $6x \cdot 5$ skal være pluss./Forteiknet føre $6x \cdot 5$ skal vere pluss.

B 13

a) $x^2 + 10x + 25$ b) $x^2 + 8x + 16$ c) $x^2 - 6x + 9$ d) $x^2 - 14x + 49$
e) $4x^2 + 12x + 9$ f) $25x^2 - 30x + 9$ g) $25x^2 + 80x + 64$ h) $16x^2 - 64x + 64$
i) $36x^2 + 120x + 100$

B 14

a) $x^2 + 17x + 27$ b) $3x^2 + 21x + 28$ c) $16x^2 + 52x + 41$ d $18x^2 + 59x + 40$
e) $10x^2 + 37x + 16$ f) $28x^2 + 49x + 21$ g) $21x^2 - 5x - 8$ h) $3x^2 - x$
i) $3x^2 + 4x - 1$ j) $5x^2 + 13x + 2$

B 15

a) $-3x^2 + 10x + 2$ b) $-4x + 1$ c) $x^2 - 2x - 5$ d) $x^2 - 7x - 4$
e) $-x^2 + 5x - 2$ f) $8x + 8$

B 16

Feil 1: $15x^2 - 2 \cdot 3x + 2 \cdot 4 - (x \cdot 2x - 4 \cdot 3 + 2x - 3 \cdot 4) =$
Feil 2: $15x^2 - 6x + 8 - 2x^2 - 4x - 6x + 12$

Når parentesen med minus løses opp, må alle fortegn endres. Her er ikke + 2 endret til – 2 og – 4x er ikke endret til + 4x./ Når parentes med minus føre blir løyst opp, må vi endre alle forteikna. Her er ikkje + 2 endra til – 2 og – 4x er ikkje endra til + 4x.

B 17

a) 8 b) –34 c) 7

B 18

a) $2a + 4b + 2c$ b) 48 cm c) 56 cm

B 19

a) $\frac{6}{7}$ b) $\frac{12}{11} = 1\frac{1}{11}$ c) $\frac{7}{10}$ d) $\frac{11}{42}$ e) $\frac{10}{13}$ f) $2\frac{4}{7}$
g) $\frac{6}{35}$ h) $\frac{2}{7}$ i) $\frac{5}{9}$

B 20

Seghen 496 kr Ali 620 kr Anne 124 kr

B 21

Arnt måker 18 m./Arnt mokar 18 m.

B 22

10 g gjær
2 dl vann/vatn
4 dl rugmel/rugmjøl
1,5 dl hvetemel/kveitemjøl
1 ts salt

B 23 Mons 993,50 kr Ole 903,20 kr Kirsten 1264,50 kr Randi 1038,70 kr

B 24

a) $2 \cdot 5 \cdot x \cdot y$
b) $x \cdot x \cdot y$
c) $2 \cdot 2 \cdot 2 \cdot y \cdot y$
d) $2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot y \cdot y \cdot y$
e) $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot a \cdot a \cdot b$
f) $2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot y \cdot y$
g) $2 \cdot 2 \cdot 2 \cdot 7 \cdot x \cdot y \cdot y$
h) $2 \cdot 7 \cdot x \cdot x \cdot x \cdot y$

B 25

a) $2y$ b) $\frac{x}{2}$ c) $\frac{7 \cdot ab}{3}$ d) $\frac{3xy}{5}$ e) $\frac{a}{3b}$ f) $\frac{y}{3x}$
g) $\frac{3ab}{2}$ h) $\frac{1}{2xy}$

B 26

a) $\frac{9}{a}$ b) $\frac{9x}{7}$ c) $\frac{7}{ab}$ d) $\frac{13}{6x^2y}$ e) $\frac{3}{a^2}$ f) $\frac{7x + 15y}{13}$

B 27

a) $\frac{13x}{12}$ b) $\frac{7}{6x}$ c) $\frac{x}{4}$ d) $\frac{19a}{42b}$ e) $\frac{41x}{180}$

B 28

a) $\frac{5x + 9}{3}$ b) $\frac{8a + 3b}{7}$ c) $\frac{4x + 4}{11}$ d) $\frac{2a + 9b}{ab}$

B 29

a) $\frac{2y}{3x}$ b) 1 c) $\frac{4y}{3}$ d) $\frac{20ax}{3by^3}$ e) $\frac{3b}{5a}$ f) $\frac{4xy}{ab^2}$
g) $\frac{8b}{a^2}$ h) $\frac{ax}{6}$

B 30 a) $9y$ b) $10x$ c) $9a$ d) $10b$ e) $13x$ f) $26y$

B 31 a) $6a$ b) $8y$

B 32 –

B 33 Kaller vi lengden av det korteste røret a, vil den totale lengden av rørene bli $7a$./Kallar vi lengda av det kortaste røret a, blir den samla lengda av røra $7a$.

B 34 a) $4x$ b) $9y$ c) $13x$ d) $6a$ e) $8b$ f) $5c$

B 35 a) $4x + 6y$ b) $8a + 6b$ c) $2a + 2b$ d) $y + 2x$ e) $6a - 3b - 6y$
f) $8c + 2d$

B 36

a) $14a + 8b$, 52
b) $4a + 10b$, 38
c) $4a - 3b$, -1
d) $a - 2b$, -4
e) b, 3
f) $-a + b$, 1

B 37

I en parentes med plusstegn foran beholder vi fortegnene inne i parentesen uendret./I ein parentes med plussteikn føre skal vi ikkje endre forteikna inne i parentesen.

B 38

a) $6a + 3b$ b) $8x - 2y$ c) $7x - y$ d) $5a - 8b$

B 39

–

B 40

I en parentes med minustegn foran må vi endre fortegnene inne i parentesen når den løses opp./I ein parentes med minusteikn føre må vi endre forteikna inne i parentesen når vi løyser han opp.

B 41

a) $4x - 3y$ b) $10a - 3b$ c) $-a + 3b$ d) $3a + 4b$

B 42

a) $3x + y$ b) $x - 2y + 2$ c) 0 d) $-6x - 2y + 1$

B 43

–

B 44

a) $4x - (3y + 2x) + (3x - y) =$
$4x - 3y \underline{-2x} + 3x \underline{-y} =$
$5x - 4y$

b) $5a - (-3a + 4b) + (3a - b) =$
$5a \underline{+ 3a} - 4b + 3a - b =$
$11a - 5b$

c) $-2x + 2y) - (3x - y) + (2x - 4y) =$
$-2x + 2y \underline{-3x} + y + 2x - 4y) =$
$-3x - y$

B 45

–

B 46

a) $12x + 18$ b) $21y - 35$ c) $42a + 56$ d) $48b - 64$
e) $20x^2$ f) $-12x + 27$

B 47

a) $12x^2 + 21x$ b) $28y^2 - 12y$ c) $-30a^2 + 10a$ d) $-42x^2 - 30x$
e) $30x^2 + 15x$ f) $12y^2 - 18y$

B 48

Understrekingene viser hvor feilene er./Understrekingane viser kvar feila er.

a) $4x \cdot (2x - 3) = 4x \cdot 2x - 4x \cdot 3 = \underline{8x^2} - 12x$
b) $3y(-2y + 4) = 3y \cdot \underline{(-2y)} + 3y \cdot 4 = -6y^2 + 12y$
c) $-4a(2a - 3) = -4a \cdot 2a \underline{+ 4a \cdot 3} = -8a^2 + 12a$
d) $-4x(-5x + 2) = \underline{4x \cdot 5x} - 4x \cdot 2 = 20x^2 - 8x$

B 49

–

B 50

a) $3x^2 + 27x + 20$ b) $24y^2 + 54y + 27$ c) $6y^2 + 60y + 54$
d) $18x^2 + 73x + 35$

B 51

Understrekningene viser hvor feilene er./Understrekingane viser kvar feila er.
$(4x + 3)(2x + 7) =$
$4x \cdot 2x + 4x \cdot 7 + 3 \cdot 2x + 3 \cdot 7$
$\underline{8x^2} + \underline{28x + 6x} + 21 =$
$8x^2 + 34x + 21$

B 52

–

B 53

a) $20x^2 - x - 12$ b) $4x^2 + 25x - 21$ c) $15x^2 + 18x - 24$
d) $24x^2 - 16x - 30$ e) $12y^2 - 13y - 35$ f) $30x^2 - 22x - 28$

B 54

a) $8x^2 + 10x - 3$ b) $7x^2 + 20x - 30$ c) $11x^2 - 21x - 6$
d) $25x^2 + 57x - 5$

B 55

Understrekningene viser hvor feilene er./Understrekingane viser kvar feila er.
$(4x - 7)(3x + 2) + (2x + 3)(6x - 2) + 7 =$
$4x \cdot 3x + 4x \cdot 2 - 7 \cdot 3x - 7 \cdot 2 + 2x \cdot 6x \underline{-2x \cdot 2} + 3 \cdot 6x - 3 \cdot 2 + 7 =$
$\underline{12x^2} + 8x - 21x - 14 - 12x^2 - 4x + 18x - 6 + 7 =$
$24x^2 + x - 13$

B 56

–

B 57

Understrekningene viser hvor feilene er./Understrekingane viser kvar feila er.
$2x^2 + (3x - 2)(x + 6) + (4x + 5(3x - 2) =$
$2x^2 + 3x \cdot x + 3x \cdot 6 \underline{-2 \cdot x} -2 \cdot 6 + 4x \cdot 3x \underline{-4x \cdot 2} + 5 - 3x \cdot 2 =$
$2x^2 + 3x^2 + 18x \underline{-2x} - 12 + 12x^2 \underline{-8x} + 15x - 10 =$
$17x^2 + 23x - 22$

B 58

a) 24 cm b) 40 cm c) 34 cm d) 3 m

B 59

a) 32 cm b) 22 dm c) 22 m d) 63 m

B 60

a) $3a + 2b$ b) 16 cm

B 61

a) $4a + 4b$ b) 200 m

B 62

–

B 63

a) 29 b) 47 c) 38

B 64

a) 35 b) 21 c) 42

B 65

a) Samlet pris på 4 appelsiner og 5 epler./Samla pris på 4 appelsinar og 5 eple.
b) 23 kr

B 66

a) $10a + 6b + 8c$ b) 38 kr

B 67

a) $\frac{5}{7}$ b) $\frac{5}{11}$ c) $\frac{13}{19}$ d) $\frac{3}{13}$ e) $\frac{-4}{17}$ f) 0

B 68

a) $\frac{2}{b}$ b) $\frac{x}{3y}$ c) $\frac{x}{2y}$ d) $\frac{1}{2x}$ e) $2b$ f) $\frac{1}{2b}$

g) $\frac{1}{4x}$ h) $4x$

B 69

a) $\frac{1}{3a}$ b) $3a$ c) $\frac{6}{5y}$ d) $\frac{3}{5}$ e) $\frac{2y}{3x}$ f) $\frac{1}{3x}$

g) $\frac{2}{3x}$ h) $\frac{3}{2a}$

B 70

a) $\frac{10}{x}$ b) $\frac{9y}{x}$ c) $\frac{4}{x^2}$ d) $\frac{0}{17} = 0$ e) $\frac{3}{xy}$ f) $\frac{1}{2ab}$

B 71

a) $\frac{8}{27}$ b) $\frac{15}{16}$ c) $\frac{3}{40}$ d) $\frac{8}{27}$

B 72

a) $\frac{1}{6}$ b) $\frac{1}{3}$ c) $1\frac{4}{5}$ d) $\frac{2}{5}$

B 73

a) $3\frac{1}{3}$ b) $1\frac{1}{5}$ c) $1\frac{1}{5}$ d) $1\frac{1}{3}$

B 74

a) $\frac{4}{5}$ b) 6 c) 1 d) $\frac{1}{2}$

B 75

a) $2\frac{1}{4}$ b) $16\frac{1}{3}$ c) $4\frac{1}{2}$

B 76

a) $2\frac{1}{2}$ b) $1\frac{1}{3}$ c) $\frac{9}{10}$

B 77

a) $\frac{2}{9}$ b) $\frac{5}{21}$ c) $7\frac{1}{2}$

B 78

a) $\frac{6}{7}$ b) $\frac{2}{11}$ c) $\frac{1}{13}$

B 79 a) $\frac{14}{3}$ b) $\frac{30}{9}$ c) $\frac{37}{8}$ d) $\frac{45}{7}$

B 80 a) $1\frac{3}{5}$ b) 3 c) $6\frac{4}{5}$ d) $6\frac{1}{6}$

B 81 a) $\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{12}{20}$ b) $\frac{2}{7} = \frac{4}{14} = \frac{6}{21} = \frac{8}{28}$

c) $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$ d) $\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16}$

B 82 a) 4 b) 21 c) 7

B 83 a) 1 b) 2

B 84 a) $\frac{1}{3}$ b) $\frac{1}{4}$ c) $\frac{2}{3}$

B 85 40 kg

B 86 a) $\frac{11}{14}$ b) $\frac{7}{12}$ c) $2\frac{2}{5}$

B 87 a) $\frac{3}{5y}$ b) $\frac{2b}{3a}$

B 88 a) $\frac{6}{35}$ b) $1\frac{3}{7}$ c) $1\frac{2}{3}$

B 89 60 kr

B 90 $11\frac{1}{3}$ liter

B 91 a) 4 000 kr b) 2 000 kr

B 92 a) $1\frac{1}{3}$ b) $2\frac{11}{12}$ c) $2\frac{6}{7}$

B 93 $24\frac{5}{6}$l

B 94 a) $1\frac{1}{4}$ kg

B 95 a) $\frac{1}{4}$ b) $\frac{3}{4}$

B 96 a) $\frac{1}{2}$ b) $\frac{3}{10}$ c) $\frac{4}{10} = \frac{2}{5}$ d) $\frac{3}{4}$ e) $\frac{1}{2}$ f) $\frac{7}{10}$

g) $\frac{1}{3}$ h) $\frac{1}{4}$ i) $\frac{2}{25}$ j) $\frac{1}{50}$ k) $\frac{1}{4}$ l) $\frac{7}{1\,000}$

B 97 a) 51 b) 19 c) 1 d) – 13 e) – 20 f) – 44

B 98 Med plusstegn foran parentesen beholdes fortegnene uendret når parentesen løses opp. Med minustegn foran parentesen må vi endre fortegnene inne i parentesen når den løses opp./Med plussteikn føre parentesen endrar vi ikkje forteikna når vi løyser opp parentesen. Med minusteikn føre parentesen må vi endre forteikna inne i parentesen når vi løyser han opp.

B 99

a) $7x + 3$ b) $y - 3$ c) $-x - 1$ d) $-a + 5$ e) $5x - 1$
f) $4z + 5$ g) $2b - 4$ h) $2y + 7$ i) $7x + 4$ j) $3x + 6$
k) $-3a$ l) 0 m) $-x - y$ n) $18x$

B 100

a) $-10x^2 - 15x$ b) $-6x^2 + 4x$ c) $-9x^2 - 9x$ d) $12x^2 + 12x$
e) $10x^2 + 15x$ f) $6x^2 - 4x$
Svaret i oppgave b) er feil./Svaret i oppgåve b) er feil.

B 101

–

B 102

a) $-21x^2 - 36x$ b) $y^2 - 14y$ c) $a^2 + 23a$ d) $b^2 + 14b - 6$

B 103

a) $x^2 + 10x + 24$ b) $y^2 + 16y + 63$ c) $8x^2 + 18x + 9$ d) $30y^2 + 71y + 42$
e) $28a^2 + 74a + 48$ f) $12a^2 + 50a + 48$

B 104

–

B 105

a) $x^2 - x - 6$ b) $6x^2 - 40x - 14$ c) $20x^2 - 3x - 9$ d) $30y^2 + 9y - 12$
e) $15y^2 + 14y - 49$ f) $72y^2 - y^2 - 56$

B 106

a) $x^2 - 11x + 30$ b) $x^2 - 13x + 36$ c) $2x^2 - 20x + 32$ d) $4x^2 - 37x + 40$
e) $18y^2 - 45y + 28$ f) $-48x^2 + 98x - 49$

B 107

a) $-36y^2 + 72y - 35$ b) $-48x^3 + 42x^2 + 48x - 42$
c) $-4a^3 + 10a^2 - 10a + 25$ d) $12x^4 - 39x^2 + 30$

B 108

a) $x^2 + 8x + 16$ b) $x^2 - 10x + 25$
c) $16y^2 - 48y + 36$ d) $4a^4 + 16a^3 + 16a^2$

B 109

Understrekningen viser hvor feilene er./Understrekinga viser kvar feila er.
$5x^2 - (2x - 6)^2 + (2x - 3)(x + 4) =$
$5x^2 - (2x - 6)(2x - 6) + (2x - 3)(x + 4) =$
$5x^2 - (2x \cdot 2x - 2x \cdot 6 - 6 \cdot 2x + 6 \cdot 6) + (2x \cdot x + 2x \cdot 4 - 3 \cdot x - 3 \cdot 4) =$
$5x^2 - 4x^2 + 12\,x + \underline{12x - 36} + 2x^2 + 8x - 3x - 12$
$3x^2 + 29x - 48$

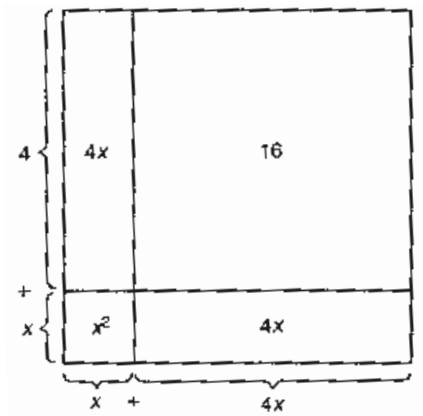
B 110

a) $18y^2 + 55y + 42$ b) $17x^2 + 44x + 21$
c) $16y^2 + 47y + 15$ d) $14x^2 - 5$
e) $-8a^2 + 4a + 9$ f) $20b^2 - 30b + 25$

B 111

a) $-2x^2 + 11x + 3$ b) $-15x + 15$ c) $-18x^2 + 13x + 5$
d) $12x^2 + 33x + 5$ e) $-29y^2 - y - 7$ f) $17y^2 + 13y + 7$

B 112



$x^2 + 4x + 4x + 16 = x^2 + 8x + 16$
$(x + 4)^2 = x^2 + 8x + 16$
Svaret blir det samme./Svaret blir det same.

B 113

a) $x^2 + 4x + 4$ b) $x^2 + 14x + 49$ c) $x^2 + 18x + 81$
d) $4x^2 + 20x + 25$ e) $9x^2 + 36x + 36$ f) $25x^2 + 10x + 1$
g) $16x^2 + 16x + 4$ h) $36x^2 + 36x + 9$

B 114

$a = 9$, $b = 5$, $c = 7$, $d = 8$

B 115

–

B 116

a) 30,96 cm² b) 62,135 dm² c) 3,1046 m²

B 117

a) – 4 b) – 55 c) 79

B 118

Multipliserer uttrykket $a = \frac{3b}{4}$ *med* $\frac{4}{3}$

B 119

$\frac{1}{\pi} \cdot A = \pi \cdot r^2 \cdot \frac{1}{\pi}$ $r^2 = \frac{1}{\pi} \Rightarrow r = \frac{\sqrt{A}}{\pi}$

B 120

a) $6x + 2y$ b) 27 cm c) $x^2 + 2xy$ d) 26 cm²

B 121

a) Arealet: $\frac{a \cdot b}{2}$ Omkretsen:/Omkrinsen. $a + b + c$

b) 12 cm²

B 122

a) 61 stolper/stolpar b) 180 m c) $61x + 180y$
d) 784 kr e) Ibrar 342 kr, Benedikte 442 kr

B 123

–

B 124 a) $\frac{16}{21}$ b) $4\frac{2}{15}$ c) $1\frac{5}{6}$ d) $\frac{32}{35}$ e) $-\frac{7}{20}$ f) $1\frac{5}{8}$

B 125 a) $\frac{x}{2y}$ b) $\frac{x}{8y}$ c) $\frac{x}{3y}$ d) $\frac{2}{3}$ e) $\frac{2}{x}$ f) $\frac{1}{2}$
g) 2 h) $\frac{2x}{3y}$

B 126 a) $\frac{1}{2x}$ b) $\frac{1}{4z}$ c) $\frac{2c}{3a}$ d) $\frac{30}{19xy}$ e) $\frac{1}{3x}$ f) 2
g) 9 h) $\frac{1}{3}$ i) $\frac{2y}{5x^2}$

B 127 a) $\frac{11}{y}$ b) $\frac{1}{x}$ c) $\frac{1}{y^2}$ d) 0 e) $\frac{5}{x+1}$ f) $\frac{a}{2a+b}$

B 128 a) $\frac{3}{10}$ b) $3\frac{1}{3}$ c) 1 d) $12\frac{1}{3}$ e) $\frac{4}{5}$ f) $5\frac{5}{8}$

B 129 a) – 17 b) – 36 c) – 9 d) 19

B 130 Med plusstegn foran parentesen beholdes fortegnene uendret når parentesen løses opp. Med minustegn foran parentesen må vi endre fortegnene inne i parentesen når den løses opp./Med plussteikn føre parentesen endrar vi ikkje forteikna når vi løyser opp parentesen. Med minusteikn føre parentesen må vi endre forteikna inne i parentesen når vi løyser han opp.

B 131 a) $9x - 10y$ b) $-12a - b + 4c$ c) $14c - 7d - 3e$

B 132 a) $3x - 15$ b) $12x^3$ c) $-8a^2 + 10a$ d) $5x^3 - 35x^2$
e) $-5x^3 - 6x^2$ f) $-4b^3 + 6b^2$

B 133 a) $-a^2 - 11a + 15$ b) $-19x^2 + 29x$ c) $-29b^2 + 31b$
d) $2x^2 + 9x - 6y$

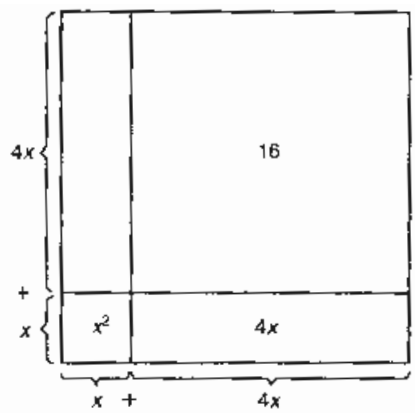
B 134 a) $x^2 + 9x + 18$ b) $12x^2 + 28x + 15$ c) $-4y^2 - 33y + 27$
d) $4a^2 - 24a + 36$ e) $-12x^2 + 16x + 28$ f) $y^4 + 10y^2 + 25$
g) $-18a^2 + 33a - 12$ h) $16x^2 - 9$

B 135 a) $-2x^2 - 35x + 12$ b) $-26x^2 - 10x + 20$ c) $11y^2 - 40y + 30$
d) $7y^2 - 18y$

B 136

a) $-32a^3 + 87a^2 - 48a$
b) $-60x^3 - 58x^2 + 40x$
c) $17y^3 + 108y^2 + 84y$
d) $32x^3 + 84x^2 + 80x$
e) $-40y^3 + 6y^2 + 63y - 40$
f) $24x^3 - 55x^2 + 12x - 25$

B 137



$x^2 + 4x + 4x + 16 = x^2 + 8x + 16$
$(x + 4)^2 = x^2 + 8x + 16$
Svaret blir det samme./Svaret blir det same.

B 138

a) $x^2 + 4x + 4$
b) $y^2 + 16y + 64$
c) $x^2 + 20x + 100$
d) $4x^2 + 24x + 36$
e) $9x^2 + 42x + 49$
f) $36y^2 + 84y + 49$
g) $81x^2 + 108x + 36$
h) $25x^2 + 110x + 121$
i) $64x^2 + 224x + 196$

B 139

a) $x^2 - 6x + 9$
b) $y^2 - 8y + 16$
c) $a^2 - 12a + 36$
d) $x^2 - 14x + 49$
e) $4x^2 - 12x + 9$
f) $16x^2 - 48x + 36$
g) $16a^2 - 56a + 49$
h) $25x^2 - 90x + 81$
i) $36x^2 - 96x + 64$

B 140

a) $x^2 - 16$
b) $y^2 - 25$
c) $x^2 - 64$
d) $b^2 - 49$
e) $4x^2 - 25$
f) $9y^2 - 16$
g) $16y^2 - 36b^2$
h) $16x^2 - 49y^2$

B 141

a) $29a^2 - 12a - 18$
b) $-11x^2 - 4x - 50$
c) $-8x^2 - 30x + 63$
d) $6x^3 - 13x^2 - 11x - 20$
e) $-12y^3 - 56y^2 - 60y + 11$
f) $-44x^2 + 72x - 43$

B 142

$a = 5, b = 9, c = 8, d = 7$

B 143

$a = 10, b = 3, c = 2, d = 5, e = 4$

B 144

–

B 145

$(x + y)(x + y) + (x - y)(x - y) =$
$x^2 + xy + xy + y^2 + x^2 - xy - xy + y^2 =$
$2x^2 + 2xy + 2y^2 - 2xy =$
$2(x^2 + y^2)$

B 146 $\frac{1}{\pi} \cdot A = \pi \cdot r^2 \cdot \frac{1}{\pi}$ $\quad r^2 = \frac{A}{\pi} \Rightarrow r = \sqrt{\frac{A}{\pi}}$

B 147 a) 144 b) – 297

B 148 a) $8\frac{4}{9}$ b) $73\frac{1}{3}$

B 149 a) – 7 b) – 22

B 150
a) Formel for arealet: $A = a^2 + 3ab$
Formel for omkretsen/omkrinsen: $O = 8a + 2b$
b) $A = 261{,}34\ m^2$ $\quad O = 77{,}4\ m$

B 151 a) Formel for arealet. $A = 2ab + \frac{ab}{2}$ b) $12{,}5\ cm^2$

B 152
a) Tirsdag/Tysdag
b) De satte ikke garn den dagen./Dei sette ikkje garn den dagen.
c) 39 kg d) $14x + 25y$ e) 58 kr

B 153
a) Arealet av figuren: $A = 2xy + y^2 + \frac{1}{4}\pi x^2$

Omkretsen/Omkrinsen av figuren: $O = 2x + 4y + \frac{1}{2}\pi \cdot x$

b) $A \approx 30{,}0\ cm^2$ $\quad O \approx 21{,}3\ cm$

B 154 a) Arealet av figuren: $A = \frac{x^2(2+\pi)}{4}$ b) $A \approx 25\ cm^2$

B 155 a) 81 kg b) $18x$ c) $60x + 21(x + 5)$ d) 65,00 kr

B 156
a) Arealet av figuren: $A = a^2 + \frac{\pi a^2}{4} = \frac{4a^2 + \pi a^2}{4} = \frac{a^2(4+\pi)}{4}$

Omkretsen/Omkrinsen av figuren: $O = 2\pi \cdot a$

b) $A \approx 48{,}3\ cm^2$ $\quad O \approx 32{,}7\ cm$

B 157 –

B 158 $A \approx 31\ cm^2$ $\quad O = 27{,}5\ cm$

B 159 a) $\frac{2}{3b}$ b) $\frac{2}{5x}$ c) 9 d) $\frac{1}{4a}$ e) $\frac{1}{3xy}$ f) $\frac{c}{3a}$
g) $\frac{a}{3c}$ h) $\frac{5}{3xy}$

B 160 a) $\frac{7x-8}{19}$ b) $\frac{4a-13}{3a+b}$ c) 0 d) $\frac{5y}{x^2+y}$

B 161 a) $\frac{5}{6}$ b) $\frac{a+b}{ab}$ c) $\frac{17}{5x}$ d) $\frac{19}{10x}$ e) $\frac{5y+3x}{xy}$ f) $\frac{2y-3x}{3xy}$

B 162 a) $\frac{4x+3}{x}$ b) $\frac{9x-2}{x}$ c) 1 d) $\frac{11x+1}{3}$ e) $\frac{9x+7}{5}$ f) $\frac{x-7}{2}$

B 163 a) $\frac{3x}{x-1}$ b) $\frac{x+1}{x+5}$

B 164 a) $\frac{7x-3}{x+2}$ b) $\frac{x+3}{2}$

B 165 a) $\frac{1}{6}$ b) $\frac{1}{xy}$ c) $\frac{1}{3xy^2}$ d) $\frac{y^2}{x^4}$ e) $\frac{y}{x}$ f) $\frac{y}{2x}$

B 166 a) $\frac{3}{5}$ b) xy c) $\frac{xy}{2}$ d) $\frac{3}{2x}$

B 167 a) $\frac{8}{15}$ b) $\frac{5}{6}$ c) $\frac{10}{8} = 1\frac{1}{4}$ d) $\frac{289}{144} = 2\frac{1}{144}$ e) $\frac{4}{5}$
f) $\frac{10}{3} = 3\frac{1}{3}$

B 168 a) $\frac{3}{5}$ b) $\frac{2x+3}{x+5}$ c) $\frac{1}{2}$ d) $\frac{1}{5}$ e) 3 f) $\frac{1}{5}$

B 169 a) 2 b) 5 c) 2 d) $\frac{x^2-4x+4}{2x-2}$

B 170 a) $\frac{9x-1}{2(x+3)}$ b) $\frac{7x-2}{3(x-2)}$ c) $\frac{2a^2+2b^2}{a^2-b^2}$ d) $\frac{5x^2+12}{6x^2-24}$

B 171 a) $\frac{4x+13}{6(x+2)}$ b) $\frac{16-x}{10(x+3)}$ c) $1\frac{1}{3}$ d) $\frac{5x-30}{36x-54}$
e) $\frac{4x^3+12x^2+7x+39}{6x(2x-3)(2x+3)}$ f) $\frac{7a+21}{6a^2+18a}$

B 172 a) $\frac{9}{8a-12}$ b) $\frac{-2a^2+2a+4}{a(a+2)}$ c) $\frac{3}{5(x-1)}$ d) $\frac{16-x}{10(x+3)}$
e) $\frac{5x-30}{36x-54}$ f) $\frac{a}{a+1}$ g) $\frac{9x-11}{12(2x+1)}$ h) $\frac{x+2}{6x-12}$

B 173
a) Fortegnsfeil i 2. linje og 3. linje./Forteiknfeil i 2. linja og 3. linja.
b) Fortegnsfeil i siste linje./Forteiknfeil i siste linja.
c) Fortegnsfeil i siste linje./Forteiknfeil i siste linja.

B 174
a) Martin må faktorisere før han forkorter./Martin må faktorisere før han forkortar.

B 175 a) $1\frac{1}{3}$ b) $\frac{x+3}{x+2}$ c) $\frac{a+3}{3a+5}$ d) 3 e) $\frac{a^2+2a+3}{3a^2-2}$ f) $\frac{2(2x-3)}{3x+1}$ g) $\frac{x}{3}$ h) $\frac{7a^2}{2}$

B 176 Lene har rett.

B 177 a) $(2x+3)^2$ b) $(3x+5)^2$ c) $(7x+3)^2$ d) $(9x+6)^2$ e) $(5a+3b)^2$ f) $(3xy+5z)^2$

B 178 a) $(2a-5y)^2$ b) $(4x-3y)^2$ c) $(11a-12b)^2$ d) $(6x-4y)^2$

B 179 a) $(x+5)(x-5)$ b) $(x+4)(x-4)$ c) $(x+9)(x-9)$ d) $(a+8)(a-8)$ e) $(2a+3b)(2a-3b)$ f) $(5a+7b)(5a-7b)$

PRØV DEG SELV

PB 1 a) $9x = 27$ b) $5x - 3y + 3z = 18$

PB 2 a) $8a + 3$ b) $-x - 2y$ c) $-7a - b$

PB 3 a) $12x + 20$ b) $10x^2 - 35x$

PB 4 a) $x^2 + 8x + 15$ b) $6x^2 - x - 15$ c) $4y^2 - 39y + 27$

PB 5 a) $16x^2 - 56x + 49$

PB 6 a) $2x^2 + 29x + 17$ b) $-10x^2 + 37x - 32$ c) $-6x3 + 30x^2 - 36x + 14y^2 - 17y + 21$ d) $20x^2 - 20x + 25$ e) $21y^2 - 16y + 50$

PB 7 a) $\frac{2}{5}$ b) $\frac{3}{5}$

PB 8 a) $\frac{3}{4}$ b) $\frac{5}{18}$

PB 9 a) $\frac{7}{12}$ b) 1 c) $\frac{11}{12}$ d) $\frac{8}{15}$ e) $\frac{16}{27}$ f) $\frac{22}{7} = 3\frac{1}{7}$ g) 2 h) $\frac{2}{3}$ i) $\frac{5}{3} = 1\frac{2}{3}$

PB 10 $\frac{5}{6}$ er størst

PB 11 $\frac{2}{5}$

PB 12 15 timer

PB 13

80 g makaroni
4 dl melk/mjølk
$\frac{1}{3}$ revet muskatnøtt/rivenmuskatnøtt
$\frac{1}{6}$ hvit pepper/kvit pepar
2 egg
100 g kokt skinke

PB 14 8 flasker

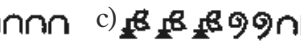
PB 15 $\frac{1}{5}$

PB 16 $\frac{3a}{5}$

PB 17 a) $\frac{3}{4}$ b) $\frac{9}{80}$ c) $\frac{7}{2x}$ d) $\frac{5}{3a}$ e) $\frac{2x+5}{2}$ f) $3\frac{5}{6}$ g) $2\frac{5}{8}$ h) $4\frac{1}{30}$

PB 18 a) $42a + 22b + 50c + 2d$ b) 485 kr

TEMAOPPGAVE: GLIMT FRA MATEMATIKKENS HISTORIE

TB 1 a)  b)  c)  d) 

TB 2 a)  b)  c) 
d)

TB 3 400 000 okser/oksar, 1 421 000 geiter, 120 000 fanger/fangar

TB 4 a) 14 $\left(x + \frac{x}{7} = 16\right)$

TB 5 –

TB 6 –

TB 7 84 år

TB 8

TB 9 144 hunnkaniner
(1,1, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...)

TB 10 15

TB 11 –

TB 12 –

FASIT TIL KAPITTEL C
ANVENDT MATTEMATIKK

C 1	a) 300 km	b) 600 km	c) 4000 km	d) 10 500 km	e) 30 km
C 2	a) ≈ 67 km/t	b) 67 km/t	c) 87,5 km/t	d) 60 km/t	
C 3	1100 km/t				
C 4	a) 2 t	b) 2 t	c) 3 t	d) 2 t	
C 5	a) 4 t	b) 2 t 30 min	c) 2 t		
C 6	a) 2 t 30 min f) 21 min	b) 3 t 12 min g) 40 min 48 s	c) 4 t 27 min h) 8 t 42 min	d) 3 t 15 min	e) 4 t 6 min
C 7	a) 4 min 36 s f) 16 min 24 s	b) 3 min 48 s g) 6 min 3 s	c) 1 min 30 s h) 5 min 6 s	d) 6 min 54 s	e) 8 min 18 s
C 8	a) ≈ 1,67 t f) ≈ 9,83 t	b) 3,8 t	c) 6,9 t	d) ≈ 4,42 t	e) ≈ 2,12 t
C 9	a) ≈ 4,47 min e) ≈ 8,87 min	b) 3,7 min f) 18,8 min	c) 7,2 min	d) ≈ 12,23 min	
C 10	a) ≈ 1,4 m/s	b) ≈ 5,6 m/s	c) ≈ 16,7 m/s	d) 250 m/s	e) ≈ 583 m/s
C 11	a) 43,2 km/t	b) 36 km/t	c) 28,8 km/t	d) 432 km/t	
C 12	a) 6 m/s	b) 21,6 km/t	c) 1 min 23 s		

C 13

a) USA, Storbritannia og land som bruker euro

b) 1 dansk krone ≈ 1,04 norsk krone
1 svensk krone ≈ 0,84 norsk krone
1 islandsk krone ≈ 0,09 norsk krone
1 sveitsisk franc ≈ 4,66 norsk krone
1 pund sterling ≈ 11,12 norsk krone

c) 100 danske kroner er 103,84 norske kroner. Vi finner da prisen på 1 dansk krone ved å dele på 100./100 danske kroner er 103,84 norske kroner, Vi finn da prisen på 1 dansk krone ved å dele på 100.

C 14	63,50 NOK	**C 15**	259 NOK	**C 16**	31,34 NOK		
C 17	3530,56 NOK	**C 18**	72,35 EUR	**C 19**	134,89 GBP		
C 20	238,20 NOK	**C 21**	9,48 USD	**C 22**	234,55 USD		
C 23	a) 46 % jenter	54 % gutter	b) 37,5 % jenter	62,5 % gutter			
C 24	50 %	**C 25**	20 %	**C 26**	20 %		
C 27	40 %	**C 28**	20 %	**C 29**	15 %		
C 30	20 %	**C 31**	a) 10 %	b) 5,72 kr	c) 75,4 %		
C 32	30 spillere	**C 33**	500 kr	**C 34**	50 liter		
C 35	120 m	**C 36**	11 429 kr	**C 37**	62,9 g		
C 38	597,6 g	**C 39**	20,5 g	**C 40**	kl. 21.10		
C 41	a) 12.35	b) 13.20	c) 15.30	**C 42**	6 t og 35 min		
C 43	a) 19.10	b) 18.40		**C 44**	18.05		
C 45	a) Strekning	b) Fart	c) Tid	d) –			
C 46	a) 54 km	b) 2080 km	c) 40 km	d) 1 km			

C 47 a) 160 km b) 480 km c) 40 km

C 48 a) 200 km b) 320 km c) 50 km

C 49 780 km **C 50** 912 000 km

C 51 a) 20 km/t b) 15 km/t c) 40 km/t

C 52 a) 50 km/t b) 30 km/t c) 75 km/t

C 53 60 km/t **C 54** 75 km/t **C 55** 31 km/t

C 56 a) 3 t b) 2 t c) 1 1/2 t

C 57 a) 3 t b) 1 t c) 1/2 t **C 58** 5 t

C 59
a) = k) = f) e) = i) = m) g) = q) = l)
b) = r) = d) c) = n) = j) p) = o)

C 60 a) 3 t 30 min b) 8 t 48 min c) 4 t 18 min d) 1 t 45 min

C 61 a) 1 t 24 min b) Ole

C 62 a) 2,25 t b) 2,6 t c) 2,75 t d) 2,9 t

C 63 a) 3,8 t b) 38 km **C 64** 40 km/t

C 65 a) 60 km b) 7,5 km/t **C 66** 3 t 30 min **C 67** 892 km/t

C 68
a) 88,96 NOK b) 44,48 NOK c) 68,64 NOK d) 116,10 NOK
63,36 NOK 42,24 NOK 88,96 NOK 132,00 NOK

C 69 a) 39 EUR b) 400 NOK c) 230 NOK

C 70 310 NOK **C 71** 526 NOK **C 72** 1335 NOK

C 73 41,79 NOK **C 74** a) 223,82 NOK 300,24 NOK b) 74,42 kr

C 75 a) England b) Pund sterling c) 316,55 GBP

C 76 a) Euro b) 239 SEK c) 261,62 EUR

C 77 a) 0,18 b) 0,37 c) 0,06

C 78 a) 16/100 b) 58/100 c) 95/100

C 79

a) 35 %	b) 69 %	c) 8 %	d) 7 %
e) 125 %	f) 87 %	g) 260 %	h) 17,5 %

C 80

Prosent	Brøk	Desimal
10 %	10/100	0,10
58 %	58/100	0,58
60 %	6/10	0,6
75 %	75/100	0,75
40 %	40/100	0,4
1 %	1/100	0,01

C 81

a) 42 kr	b) 24 liter	c) 780 kg
d) 22,50 kr	e) 2960 kr	f) 5,95 gram

C 82 a) 32 tonn b) 3,6 kg c) 840 kr d) 66,4 gram

C 83 6 elever

C 84 3,5 kg

C 85 a) 1760 kr b) 23 760 kr

C 86 a) 120 kr b) 245 kr

C 87 a) 27 %

b) Kino 120 kr
Klær 300 kr
Smågodt 288 kr
Brus 168 kr
Diverse 324 kr

C 88 a) 168 elever b) 72 elever

C 89 a) 300 kr b) 2300 kr

C 90 90 gram sølv

C 91 a) 280 kr b) 160 kr c) 292,50 kr d) 180 kr

C 92 a) 12 640 kr b) 145 360 kr

C 93 a) 300 kr b) 140 kr c) 6960 kr

C 94 a) 4,8 kg b) 84,8 kg

C 95 a) 294 kr b) 73,50 kr

C 96 a) 22 b) 27,2 % c) 72,8 % d) 100 %

C 97 a) 4 b) 25 % c) 75 %

C 98 a) 148 bilførere b) 7,5 % c) 92,5 %

C 99 a) 420 kr b) 170 kr c) 160 kr d) 280 kr e) 1120 kr
f) 370 kr g) 1) 15 uker 2) 11 uker 3) 10 uker

C 100 a) 1990 km (én vei) b) 69 km/t c) 186 liter d) 11,67 Dkk
e) 12,84 NOK f) 2080 NOK g) 2000 Dkk og 359 euro

C 101 a) 8 t 46 min b) Årets korteste dag fra soloppgang til solnedgang
c) 6 timer

C 102 a) 9 t 53 min b) Opp når månebuen (sigden) peker mot høyre.

C 103 a) s = strekning, v = fart, t = tid b) –

C 104 a) 128 km b) 2490 km c) 0,96 km
d) 135 m e) 18 000 000 km

C 105 5625 km

C 106 455 km

C 107 a) 1700 m b) $9{,}46 \cdot 10^{12}$ km c) 10 km

C 108 a) 1 t 48 min b) 2 t 42 min c) 5 t 18 min
d) 0 t 30 min e) 0 t 45 min f) 0 t 6 min

C 109

a) 2 min 24 s b) 1 min 30 s c) 0 min 42 s
d) 0 min 15 s e) 0 min 30 s f) 1 min 12 s

C 110

a) 0,75 t b) 0,50 t c) 0,167 t
d) 3,13 t e) 7,83 t f) 3,4 t

C 111 338 km

C 112 13,3 km

C 113 58,3 km

C 114 8 km/t

C 115 a) 50 km/t b) 75 km/t c) 81,8 km/t

C 116 65,9 km/t

C 117 37,3 km/t

C 118 140 km

C 119

a) 100 km b) 65,6 km/t c) 2 t 40 min

C 120 10 min

C 121 a) 36 km/t b) 144 km/t c) 21,6 km/t

C 122

a) 6,9 m/s b) 22,2 m/s c) 41,7 m/s

C 123

a) 0,5 km/min b) 1,5 km/min c) 1,2 km/s

C 124

a) 833 m/s b) 50 km/min c) 0,83 km/s

C 125 1,96 s

C 126

SR-71 2,8 mach
Visper 2,1 mach
Bong 747 0,8 mach

C 127 83,3 km/t

C 128 55,6 km/t

C 129

a) 70 km/t b) 40 min pause c) 51,4 km/t d) 2 t 45 min e) 64 km/t
f) 28 km g) 60 km/t h) Mer bratt kurve, større fart i) Lik fart

C 130

a) Storbritannia, Sverige, Danmark, Tyskland og Sveits
b) 77,84 NOK, 484,76 NOK, 145,38 NOK, 150,93 NOK, 55,96 NOK

C 131

a) 333,60 NOK b) 7 753 420 NOK

C 132

1926 DKK, 387,60 EUR

C 133 a) CHF b) Sveitserfranc c) 466,30
d) 600 franc e) 2847,80 NOK

C 134 10,83 NOK **C 135** 7,50 **C 136** 454,167

C 137 I banken – **C 138**

C 139 a) 1920 kr b) 405 kr c) 3450 kr d) 264,60 kr

C 140 c) 75 % **C 141** b) 6 % **C 142** c) 16 2/3 %

C 143 a) 8 kr b) 12,16 liter c) 1150 kr d) 65,7 gram

C 144 15,21 gram **C 145** 7 gram **C 146** 30 %

C 147 a) 3957 kr b) 3746,25 kr c) 840 kr

C 148 32 % **C 149** 12,5 % **C 150** 7,5 %

C 151 1550 passasjerer **C 152** 450 juletrær **C 153** 44 %

C 154 17,9 % **C 155** 1207 kr

C 156 a) 10 000 kr b) 10 500 kr

C 157 a) 130 000 kg b) 8,5 kg **C 158** 140 kg

C 159 a) 4600 kr b) L: 1840 kr E: 1150 kr

C 160 a) Lysgård: 75 kr Flaskerud: 60 kr b) 13 uker 9 uker
c) 768 km d) 576 kr e) 11 kr
f) L: 1164 kr F: 1296 kr g) –

C 161 3750 kr

C 162

a) 300 km b) 3 t 30 min c) 50 km/t d) 1170 NOK, han tjente 270 kr
e) 228 km f) 1023 km g) 17 t h) 60 km/t

C 163

a) 4 t 31 min 5 t 54 min 0 t 0 min b) 38 min
c) 30 min

C 164

a) 4,3 km b) 585 km

C 165

a) $1{,}326\,325 \cdot 10^6$ km b) 10 833 m/s
c) 10,8 km/s d) 648 km/min

C 166 1,2 km

C 167 52,5 km/t

C 168 120,4 km/t

C 169

a) 103,7 km/t b) 116,7 km/t c) 28,8 m/s og 32,4 m/s

C 170

a) 112,6 km/t b) 95,5 km/t c) 80,5 km/t

C 171 ≈ 23,2 km/t

C 172 ≈ 17,9 km/t

C 173

a) 33 t 29 min b) ≈ 173,4 km/t

C 174

a) 3 døgn 10 t 52 min

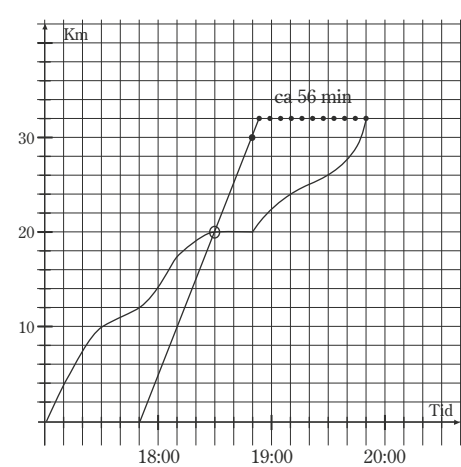
C 175 4 132 596 km/døgn = 172 191,5 km/t

C 176 –

C 177

a) – b) – d) ca. 56 min e) 20 km fra Smijordet

c) Vi har brukt gjennomsnittsfarten til mopedene. De klarer ikke å kjøre jevnt på den hele veien.



C 178

a) 7 t (Helst litt fart!)
b) Maks 77,78 km
c) 37,5 km
d) ca. 65 km

C 179

Tørr
a) 93,3 m
b) 41,7 m
c) 18,3 m

Is
a) 342 m
b) 139 m
c) 53,3 m

C 180

210 km

C 181

a) 61,54 km/t
b) Nei, avstanden forkortes bort i beregningene. Forsøk med en variabel avstand.

C 182

3,0 km

C 183

1562,10 NOK

C 184

a) 292,50 DKK
b) 303,73 NOK
c) 288,47 NOK

C 185

a) Belgia
b) 2137,80 NOK

C 186

3685,80 NOK

C 187

Kurs 7,40

C 188

a) –
b) ca. 840 NOK
c) ca. 54 CHF

C 189

a) 110
b) 120
c) –
d) A: 64 euro
B: 70 euro
e) 46,20 NOK

C 190

a) 18 %
b) 0,7 %
c) 20 %
d) 16,67 %
e) 30 %

C 191

b) 42 %

C 192

a) 77
b) Drama: 20,7 %
Fransk: 18,2 %
Ballspill: 23,4 %
Skoleavis: 10,3 %
Elektronikk: 19,5 %
Porselensm.: 7,8 %

C 193

56 %

C 194

11,7 %

C 195

a) 160
b) Røde: 80
Gule: 40
Blå: 16

C 196 8. klasse: 31,0 % 9. klasse: 33,3 % 10.klasse: 35,7 %

C 197 1 476 500 stemte **C 198** 4,8 %

C 199 a) 7,93 m b) 48,7 % lengre

C 200 a) 4 230 769 kr b) 4 780 769 kr

C 201 Til Sverige: 63,7 % Til Finland: 28,6 % Til Russland: 7,7 %

C 202 a) Ja: 46,5 % Nei: 53,5 % b) 2 646 036 stemmeberettigede
c) Nei: 87,2 % Ja: 12,8 %

C 203 1 g **C 204** a) 3600 kr b) 20 %

C 205 a) ca. 81 NOK b) ≈ 49 %

C 206 a) 20 % mindre b) 25 % mer

C 207 a) 6 kg b) 75 kg

C 208 1 200 000 kr **C 209** 1,7 ‰ **C 210** 300 kr

C 211 122,5 g salter **C 212** a) 0,1 % b) 10 % c) 11,1 %

PRØV DEG SELV

PC 1 a) 240 km b) 30 km c) ≈ 136 km

PC 2 a) 7 km/t b) 9,33 km/t c) 7,78 km/t

PC 3 2 t 28 min **PC 4** a) 2541 kr b) 771,4 km/t c) 0,63 mach

PC 5

a) Tur med jevn fart. Pause etter en time b) 36 min pauser
c) 14 km/t d) 3 timer e) 18,6 km/t f) 13,3 km/t

PC 6

924 NOK

PC 7

a) 5 % b) 42 % c) 20 % d) 75 %

PC 8

a) 50 kr b) 15 gram c) 1040 kr

PC 9

1470 kr

PC 10

34,5 % menn

PC 11

300 kr

PC 12

500 kr

FASIT TIL FYLKESOPPGAVE AKERSHUS

FC 1

a) 11 kommuner

b) A & B $\frac{2}{22} = \frac{1}{11}$
Follo $\frac{9}{22}$
Romerike $\frac{11}{22} = \frac{1}{2}$

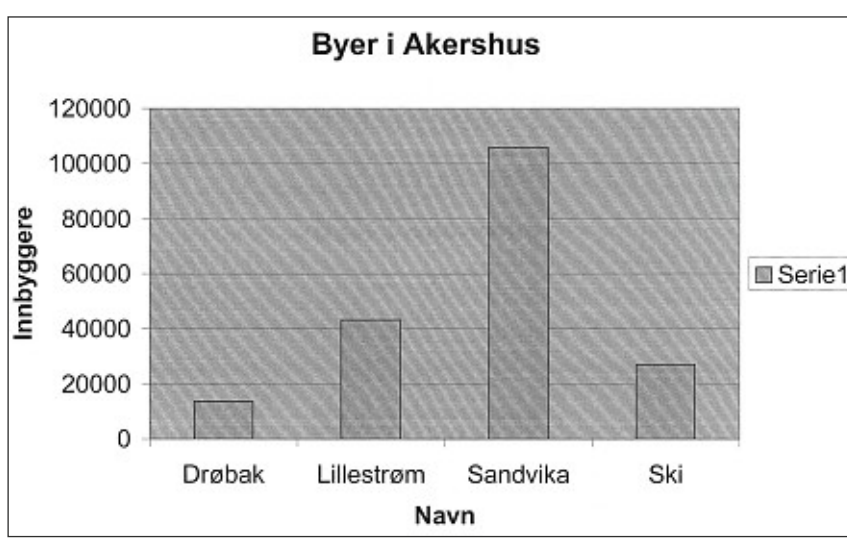
c) A & B ≈ 4 %
Follo ≈ 20 %
Romerike ≈ 76 %

d) A & B 160 585

e) 45 %

FC 2

a)



b) 22,8 %

FC 3

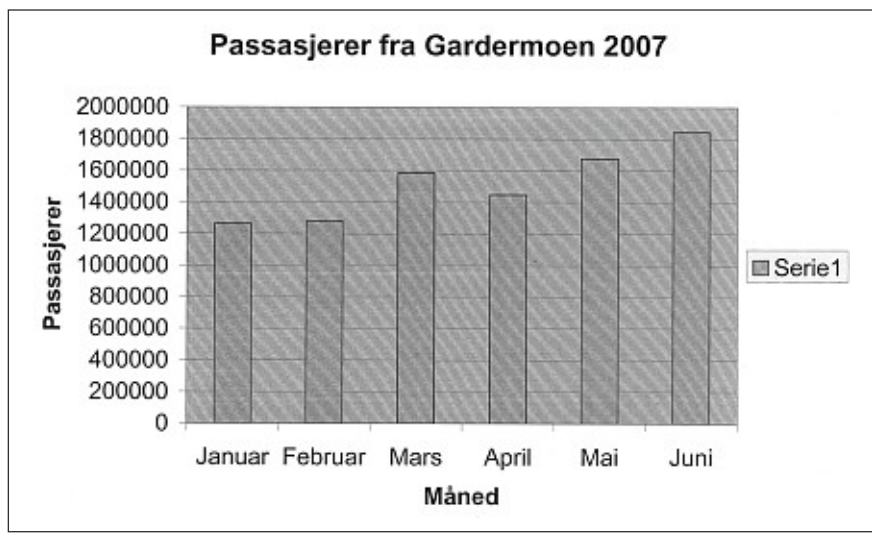
a) 0–0 1–0 0–1 1–1 2–1 1–2 2–2 2–0 0–2
b) 0–0 1–1 2–2 3–3 4–4 n–n
1 4 9 16 25 $(n + 1)^2$

FC 4

a) 3400 plasser b) 6000 plasser c) 75,5 %

FC 5

a) 1 676 167



c) Utland 53,3 %
Innland 46,7 %
d) 1 591 801
e) –

FC 6

a) 6,55 km b) Runway (Rullebane)

FC 7

a) – b) $1{,}4 \cdot 10^5$ m^2

FC 8

a) – b) 1853 c) 0,63 m d) ≈ 3,4 km
e) 850 500 tonn f) ca. 800 m g) ca. 1 s h) 23 %
i) 1 : 16 000