SOLUTIONS | SP Market Session: Bringing fun into the classroom

Exercise 6 Solutions (Page A293)

Learner Book Part 2, p. 137

1.1

	ℓ	b	Area
A	9 m	1 m	9 m^2
B	8 m	2 m	16 m^2
C	7 m	3 m	21 m^2
D	6 m	4 m	24 m^2
E	5 m	5 m	25 m^2

1.2 Rectangle E has the biggest area.

1.3.1 Rectangle E has an area of 25 m^2.

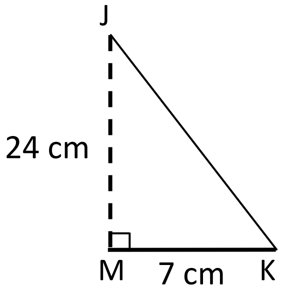
1.3.2 The dimensions of Rectangle E are 5 m $\times$ 5 m.

1.3.3 Rectangle E is a square. (it has equal sides)

Exercise 12 Solutions (Page A301)

Learner Book Part 2, p. 146

4.1



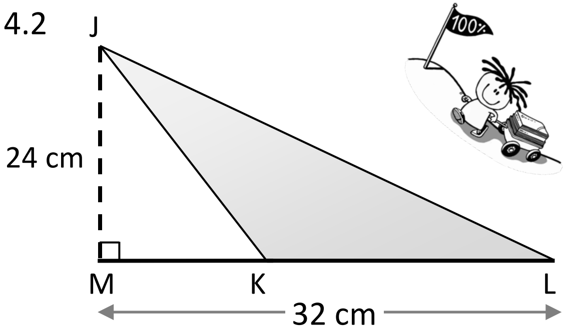
The area of ΔJMK

$= \frac{1}{2} \times \text{base} \times \perp \text{height}$

$= \frac{1}{2} \times 7 \times 24$

= 84 cm

4.2



The area of ΔJML

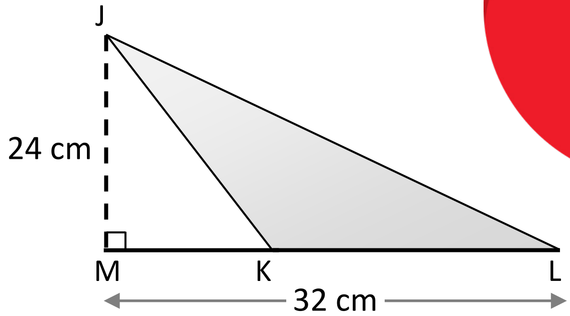
$= \frac{1}{2} \times \text{base} \times \perp \text{height}$

$= \frac{1}{2} \times \text{ML} \times \text{JM}$

$= \frac{1}{2} \times 32 \times 24$

= 384 cm^2

4.3



Method 1 (using 4.1 & 4.2)

Area ΔJKL

= Area ΔJML – Area of ΔJMK

= 384 – 84

= 300 cm^2

Method 2 (using the formula)

Area ΔJKL

$= \frac{1}{2} \times \text{base} \times \perp \text{height}$

$= \frac{1}{2} \times 25 \times 24$

= 300 cm^2

4.4 (h represents the $\perp$ height)

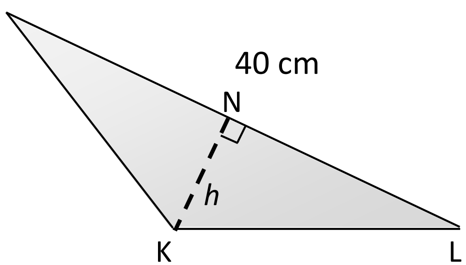
$\frac{1}{2} \times \text{JL} \times h = 300 \text{ cm}^2$

$\therefore \frac{1}{2} \times 40 \times h = 300$

$\therefore 20 \times h = 300$

$20 \times 15 = 300$

$\therefore h = 15 \text{ cm}$

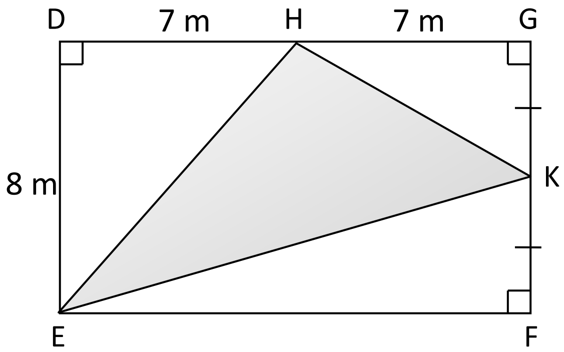


Exercise 13 Solutions (Page A301)

Learner Book Part 2, p. 147

1.1

DEFG is a rectangle because it has 4 right angles.



Area ΔHEK = Area DEFG – Area ΔEDH – Area ΔEFK – Area ΔGHK

Area DEFG = 8×14 = 112 m^2

Area ΔEDH

$= \dfrac{b \times h}{2}$

$= \dfrac{1}{2} \times DE \times DH$

$= \dfrac{1}{2} \times 8 \times 7$

$= 28\ m^2$

Area ΔEFK

$= \dfrac{b \times h}{2}$

$= \dfrac{1}{2} \times EF \times KF$

$= \dfrac{1}{2} \times 14 \times 4$

$= 28\ m^2$

Area ΔGHK

$= \dfrac{b \times h}{2}$

$= \dfrac{1}{2} \times GK \times HG$

$= \dfrac{1}{2} \times 4 \times 7$

$= 14\ m^2$

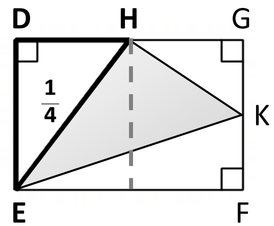
$\therefore$ area ΔHEK = 112 – 28 – 28 – 14 = 42 m^2

1.2 **Option 1** (arithmetic approach, dependent on 1.1)

The fraction of rectangle DEFG that is shaded $= \dfrac{42}{112} = \dfrac{3}{8}$

Option 2 (visual approach, not dependent on 1.1)

Rectangles have vertical and horizontal symmetry lines.

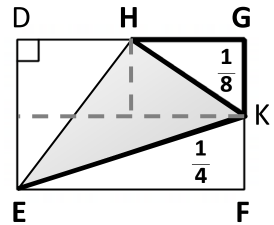


The area of Δ**DEH**

$= \dfrac{1}{4}$ of the area of rectangle DEFG

The area of Δ **GHK**

$= \dfrac{1}{8}$ of the area of rectangle DEFG



The area of Δ **EFK**

$= \dfrac{1}{4}$ of the area of rectangle DEFG

The unshaded area $= \dfrac{1}{4} \times \dfrac{2}{2} + \dfrac{1}{8} + \dfrac{1}{4} \times \dfrac{2}{2}$

$= \dfrac{2+1+2}{8}$

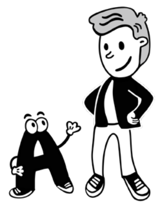
$= \dfrac{5}{8}$

$\therefore$ the shaded area $= 1 - \dfrac{5}{8}$

$= 1 \times \dfrac{8}{8} - \dfrac{5}{8}$

$= \dfrac{8-5}{8}$

$= \dfrac{3}{8}$



Exercise 12.1 Solutions (Page A53)

Questions on p. 43

7.9

$m = 38°$ ... *alternate ∠'s; AB || CD*

$n + 38° = 90°$ ... *BC ⊥ CG*

$\therefore\ n + 38° - 38° = 90° - 38°$

$\therefore\ n = 52°$

$p + 38° = 180°$ ... *co-int. ∠'s; BC ∥ DF*

$\therefore\ p + 38° - 38° = 180° - 38°$

$\therefore\ p = 142°$

$q = p$ ... *vertically opposite ∠'s*

$\therefore\ q = 142°$

Exercise 15.1 Solutions (Page A64)

Questions on p. 49

4.1

$AC^2 = AB^2 + BC^2$ ... *Pythagoras*

$= 9^2 + 12^2$

$= 81 + 144$

$= 225$

$\therefore\ AC = \sqrt{225}$

$= 15$ cm

4.2

$AD = AC + CD$

$= 15$ cm $+ 10$ cm ... *from Question 4.1*

$= 25$ cm

$\therefore\ AE^2 + DE^2 = AD^2$ ... *Pythagoras*

$\therefore\ AE^2 + 7^2 = 25^2$

$\therefore\ AE^2 = 25^2 - 7^2$

$= 625 - 49$

$= 576$

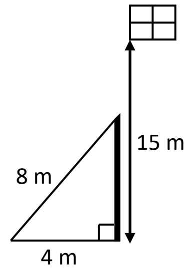
$\therefore\ AE = \sqrt{576}$

$= 24$ cm

Exercise 15.2 Solutions (Page A64)

Questions on p. 50

5. The triangle formed by the ladder and the house is a right-angled triangle.



The side opposite the 90° angle (the hypotenuse) will be the longest side of the triangle (the ladder in this example).

The height the ladder will reach up the side of the house will therefore be less than 8 m (a shorter side).

Therefore the ladder cannot reach the window.

Pythagoras could also have been used to solve for the 3rd side of the triangle if calculations were permitted. However, this question encourages logic.

Exercise 10.3 Solutions (Page A45) *Questions on p. 34*

8. It is possible here to prove congruency using all 4 cases.

In ΔOAM and ΔOBM

❶ 1) $AM = MB$ . . . *given*

2) OM is common

3) $O\hat{M}A = O\hat{M}B = 90^\circ$ . . . *given* $OM \perp AB$

$\therefore$ $\Delta OAM \equiv \Delta OBM$ . . . *SAS*

OR

❷ 1) $OA = OB$ . . . *radii*

2) OM is common

3) $O\hat{M}A = O\hat{M}B = 90^\circ$ . . . *given* $OM \perp AB$

$\therefore$ $\Delta OAM \equiv \Delta OBM$ . . . *RHS*

OR

❸ 1) OM is common

2) $AM = MB$ . . . *given*

3) $OA = OB$ . . . *radii*

$\therefore$ $\Delta OAM \equiv \Delta OBM$ . . . *SSS*

OR

❹ 1) $O\hat{A}M = O\hat{B}M$ . . . *∠'s opposite = radii*

2) OM is common

3) $O\hat{M}A = O\hat{M}B = 90^\circ$ . . . *given* $OM \perp AB$

$\therefore$ $\Delta OAM \equiv \Delta OBM$ . . . *AAS*

11.1 In ΔPQT and ΔPRS

1) $\hat{P}$ is common

2) $P\hat{Q}T = P\hat{R}S$ . . . *corresponding ∠'s ; QT || RS*

3) $P\hat{T}Q = P\hat{S}R$ . . . *corresponding ∠'s ; QT || RS*

$\therefore$ $\Delta PQT \;|||\; \Delta PRS$ . . . *AAA*

11.2 $\dfrac{PQ}{PR} = \dfrac{QT^{\,2}}{RS_{\,y}} = \dfrac{PT^{\,4}}{PS_{\,10}}$ . . . $\Delta PQT \;|||\; \Delta PRS$

$\therefore \dfrac{RS}{QT} = \dfrac{PS}{PT}$

Work from this equation rather than the sketch

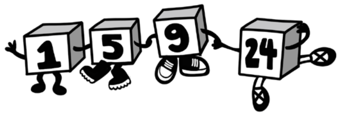
. . . it is less confusing.

$\therefore \dfrac{y}{2} = \dfrac{10}{4}$ ➡ $PS = 4 + 6$ . . .

Place what you are looking for on the top LHS of the equation.

$\therefore y = \dfrac{20}{4}$

$\therefore y = 5$ units



Exercise 12.1 Solutions (Page A53)

Questions on p. 42

4. Height of the smaller house (BC and ED)

$= \sqrt{29^2 - 20^2}$ . . . *Pythagoras*

$= 21$ m

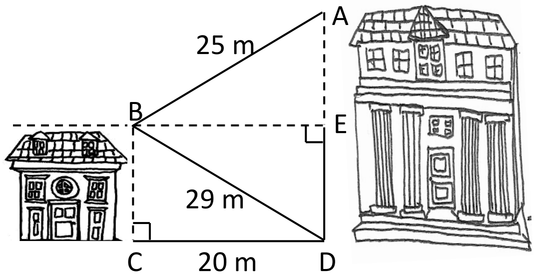
& the distance between the houses is 20 m (CD)

$\therefore$ BE = 20 m

$\therefore$ The height between roof tops is (AE)

$= \sqrt{25^2 - 20^2}$ . . . *Pythagoras*

$= 15$ m



$\therefore$ Height of the larger house $=$ ED + AE

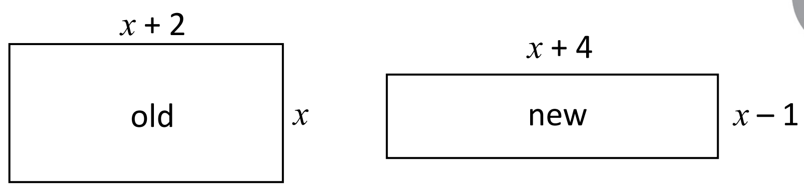
$= 21 + 15$

$= 36$ m

Exercise 13.3 Solutions (Page A57)

Questions on p. 47

3.



3.1 $P_{old} = 2(x+2) + 2x$ & $P_{new} = 2(x+4) + 2(x-1)$

$= 2x + 4 + 2x$ $\quad$ $= 2x + 8 + 2x - 2$

$= 4x + 4$ $\quad$ $= 4x + 6$

$\therefore$ Difference in perimeter

$= (4x+6) - (4x+4)$

$= 4x + 6 - 4x - 4$

$= 2$ m

3.2 Equal areas: $x(x+2) = (x+4)(x-1)$

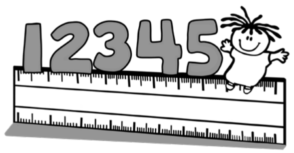
$\therefore\ x^2 + 2x = x^2 - x + 4x - 4$

$\therefore\ x^2 + 2x = x^2 + 3x - 4$

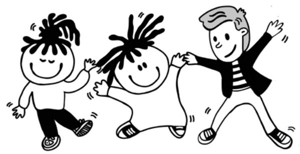
$\therefore\ 2x - 3x = -4$

$\therefore\ x = 4$ m

$\therefore$ Original dimensions: breadth 4 m and length 6 m



SOLUTIONS | Hands-on Activities



1. These solutions will differ, but the more accurate the measurements are, the closer the values of $\frac{\text{circumference}}{\text{diameter}}$ will be to 3,14159. . .

2.1

perimeter	half perimeter	length	breadth	area
16	8	7	1	7
16	8	6	2	8
16	8	5	3	15
16	8	4	4	16

2.2 The circumference = 16 units

$C = 2\pi r = 16$

$\therefore\ r = \frac{8}{\pi} \approx 2{,}55$

$A = \pi r^2 = \pi\left(\frac{8}{\pi}\right)^2 = 20{,}37 \text{ units}^2$

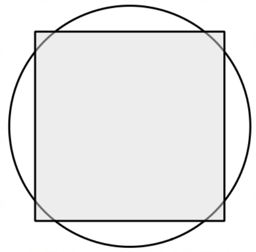
or

$A = \pi r^2 = \pi(2{,}55)^2 = 20{,}43 \text{ units}^2$

2.3.1 $4s = 40$

$\therefore\ s = 10$ units

The area of the square = $10 \times 10 = 100 \text{ units}^2$



2.3.2 The circumference = 40 units

$C = 2\pi r = 40$

$\therefore\ r = \frac{20}{\pi}$

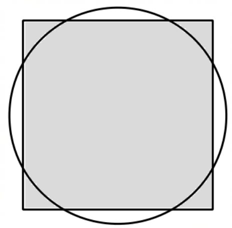
$\approx 6{,}37$

$A = \pi r^2 = \pi\left(\frac{20}{\pi}\right)^2 = 127{,}32 \text{ units}^2$

or

$A = \pi r^2 = \pi(6{,}37)^2 = 127{,}48 \text{ units}^2$

2.4.1 The perimeter of the square = $\sqrt{64}$ = 8 units



2.4.2 $A = 2\pi r = 64 = \text{units}^2$

$\therefore\ r = \sqrt{\frac{64}{\pi}} = \frac{8}{\pi}$

$\approx 4{,}51$

$C = 2\pi r = 2\pi\left(\frac{8}{\pi}\right) \approx 28{,}36$ units

or

$C = 2\pi r = 2\pi(4{,}51) \approx 28{,}34$ units