

Quick Check

Intermediate Tier

Extra Questions to be used in addition to those for the Foundation Tier

UNIT 2

- When $s = ut + \frac{1}{2}ft^2$, find s when $u = 16.5$, $t = 4.2$ and $f = -2.28$.
- If $v^2 = u^2 - 2as$, find the value of v when $u = 24.6$, $s = 2.5$ and $a = -7.2$.
- If $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$, find the value of f when
 - $u = 2.5$, $v = 5$
 - $u = -5$, $v = 7.5$

- The volume of a cylinder is given by

$$V = \pi r^2 h$$

Make r the subject of this equation.

Find the value of r when $V = 344 \text{ cm}^3$ and $h = 10.5 \text{ cm}$.

- Expand the following:

$$(a) \quad 2(x - 4) \qquad (b) \quad x(2x + 3) \qquad (c) \quad x^2(2 - x^2)$$

- Factorise the following:

$$(a) \quad 3x + 6 \qquad (b) \quad 2x^2 - 4x \qquad (c) \quad 25x + 5x^2$$

Answers

- 49.2 (1 d.p.)
- 25.3 (1 d.p.)
- (a) 1.67 (2 d.p.) (b) -15
- $r = \sqrt{\frac{V}{\pi h}}$; 3.23 cm (2 d.p.)
- (a) $2x - 8$ (b) $2x^2 + 3x$ (c) $2x^2 - x^4$
- (a) $3(x + 2)$ (b) $2x(x - 2)$ (c) $5x(5 + x)$

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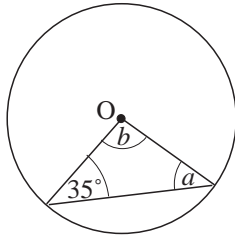
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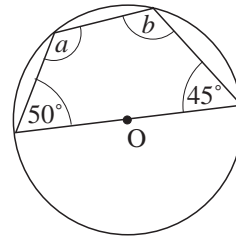
UNIT 3

1. Find the angles marked on each diagram, where O is the centre of the circles:

(a)

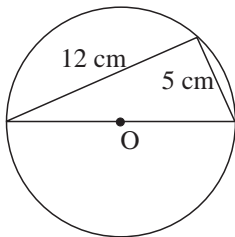


(b)

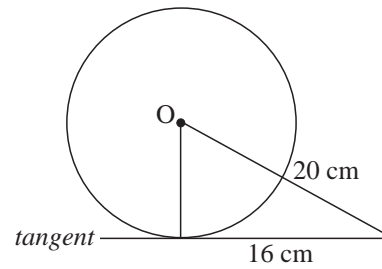


2. What is the radius of each circle shown, where O is the centre of the circles:

(a)



(b)



Answers

1. (a) $a = 35^\circ$, $b = 110^\circ$ (b) $a = 135^\circ$, $b = 130^\circ$ 2. (a) 6.5 cm (b) 12 cm

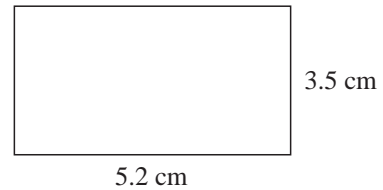
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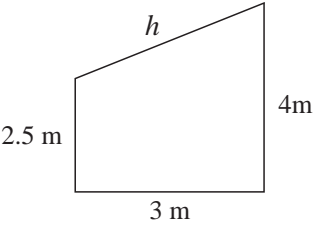
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Extra Questions to be used **in addition** to those for the Foundation Tier

UNIT 4

1. Find the diagonal length of the rectangle shown opposite:

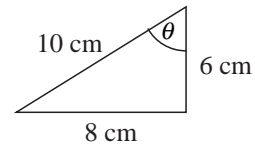


2.  The side of a garden shed is shown opposite. What is the slant height, h ?

3. For the right angle triangle shown, find:

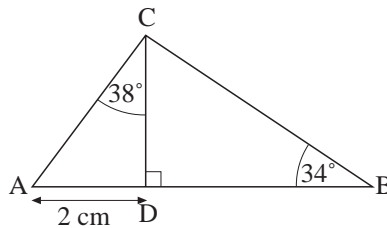
- (a) $\sin \theta$ (b) $\cos \theta$ (c) $\tan \theta$

Use each value to find θ .



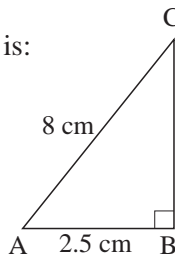
4. In the figure opposite, calculate:

- (a) the length CD,
(b) the length CB.



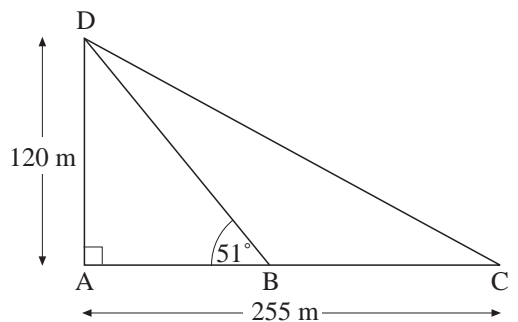
5. In the triangle shown opposite, what is:

- (a) the length CB,
(b) the angle ACB ?



6. Find, in the figure shown opposite:

- (a) length CD,
(b) angle ACD,
(c) length BD.



Answers

- | | | |
|--|-------------------------|---------------------------|
| 1. (a) 6.27 cm (2 d.p.) | 4. (a) 2.56 cm (2 d.p.) | (b) 4.58 cm (2 d.p.) |
| 2. 3.35 m (2 d.p.) | 5. (a) 7.60 cm (2 d.p.) | (b) 18.2° (1 d.p.) |
| 3. (a) $\frac{4}{5}$ (b) $\frac{3}{5}$ (c) $\frac{4}{3}$; 53.1° (1 d.p.) | 6. (a) 282 m (3 s.f.) | (b) 25.2° (1 d.p.) |
| | (c) 154 m (3 s.f.) | |

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UNIT 5

1. A four-sided spinner, labelled A, B, C and D, is spun and a fair, six-sided dice is rolled.

List all the possible outcomes.

What is the probability of spinning 'D' and rolling '6' ?

2. Two fair dice are rolled and the positive differences in scores is noted. Copy and complete the table below, showing these differences:

		<i>1st Dice</i>					
		1	2	3	4	5	6
<i>2nd Dice</i>	1	0	1	2			
	2	1					
	3	2					
	4	3					
	5						
	6						

- (a) What is the most likely difference? What is the probability of getting that difference?
- (b) What is the probability of obtaining the difference 3?
3. A biased coin is such that the probability of obtaining HEADS when the coin is thrown is $\frac{1}{3}$.
- (a) What is the probability of obtaining TAILS?
- The coin is thrown twice. By drawing a tree diagram, find the probability of obtaining:
- (b) two HEADS,
- (c) one HEADS and one TAILS (in any order).
4. A student takes examinations in *Maths*, *Physics* and *Chemistry*.
The probability of passing *Maths* is 0.8, *Physics* 0.75 and *Chemistry* 0.85.
Given that the results in each subject are independent, find the probability of:
- (a) passing all three subjects,
- (b) failing *Maths* or *Physics* but not both,
- (c) failing *Physics* or *Chemistry* or both.

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UNIT 5

Answers

1. A1 A2 A3 A4 A5 A6
 B1 B2 B3 B4 B5 B6
 C1 C2 C3 C4 C5 C6
 D1 D2 D3 D4 D5 D6

$$p = \frac{1}{24}$$

2.

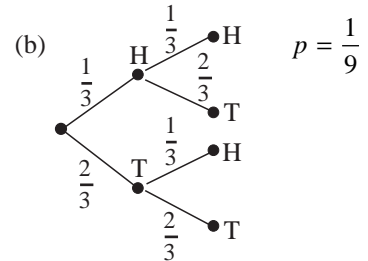
0	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

(a) 1, $\frac{10}{36} \left(= \frac{5}{18} \right)$

(c) $\frac{4}{9}$

(b) $\frac{6}{36} \left(= \frac{1}{6} \right)$

3. (a) $\frac{2}{3}$



4. (a) 0.51

(b) 0.35

(c) 0.3625

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Extra Questions to be used in addition to those for the Foundation Tier

UNIT 6

- The mass of a box is recorded as 2.74 kg to the nearest kg.
What is the possible range of values of the mass of the box?
- The Encyclopaedia Britannica has 24 volumes, each one weighing 1.6 kg, to the nearest 0.1 kg.
 - Calculate the lower bound for the total weight of the set of 24 volumes.
 - Calculate the difference between the upper and lower bounds for the total weight.
- The volume of a cylinder is given by

$$V = \pi r^2 h$$

- If h is measured as 12.4 cm, to the nearest mm, and r as 3.6 cm, to the nearest mm, what are the upper and lower bounds for the volume? Give your answer in cm^3 , to 3 s.f.
- If, for another cylinder, V is measured as 350 cm^3 , to the nearest 10 cm^3 , and h is measured as 12.4 cm, to the nearest mm, what is the maximum possible value of r ?

Answers

- 2.735 to 2.745 kg
- (a) 37.2 kg (b) 2.4 kg
- (a) 521 cm^3 , 489 cm^3 (b) 3.02 cm

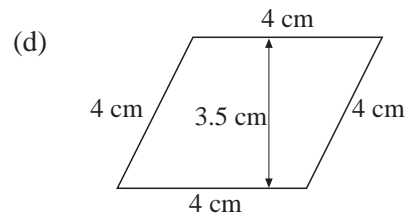
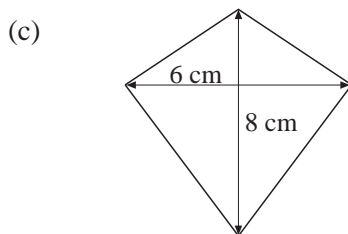
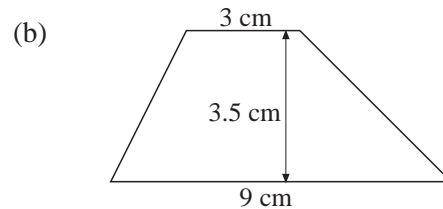
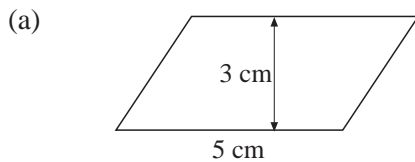
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Extra Questions to be used in addition to those for the Foundation Tier

UNIT 7

1. Find the area of each of the following shapes:



2. By considering dimensions, decide whether each of the following expressions could be a formula for

perimeter, area or volume

In the expressions, a , b and c are all lengths.

(a) $(a + b + c)^2$

(b) $\frac{4}{3}\pi a^3 + \pi a^2 b$

3. Which of the following formulae could represent the volume of an elliptical prism?

A : $\pi(ab)^2 h$ B : $\pi a^2 b h$ C : $\pi a b h$

Answers

1. (a) 15 cm^2 (b) 21 cm^2 (c) 24 cm^2 2. (a) area (b) volume
 (d) 14 cm^2 3. C

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Intermediate Tier

Extra Questions to be used in addition to those for the Foundation Tier

UNIT 9

1. A sample of 80 electric light bulbs was taken. The lifetime of each bulb is summarised in the table below:

<i>Lifetime</i>	600 –	700 –	800 –	900 –	1000 –	1100–1200
<i>Frequency</i>	4	9	18	27	20	2

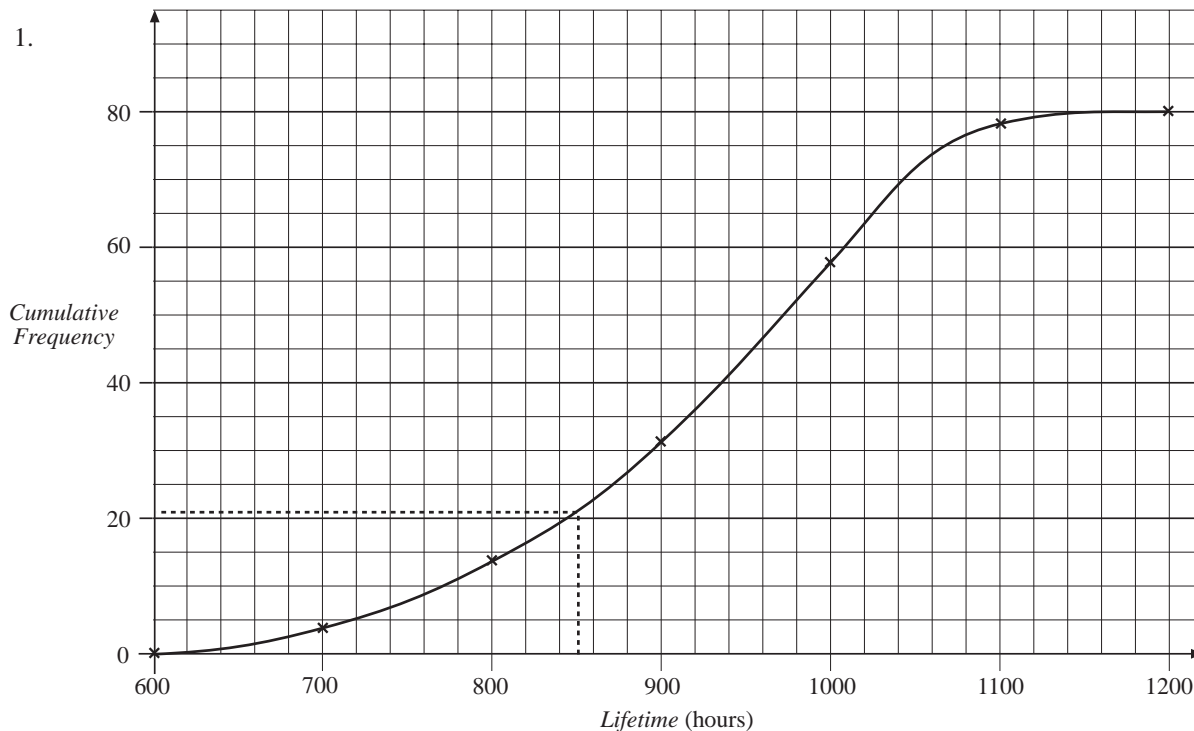
Draw a cumulative frequency curve, and use it to

- (a) estimate the number of light bulbs that lasted longer than 850 hours,
- (b) estimate the median and interquartile range.

A second sample of 80 light bulbs (from a different producer) had the same median lifetime, but had an interquartile range of 80 hours.

- (c) What can you deduce about the difference between the two samples?

Answers



- (a) 59 (b) about 940; about 165 (c) second sample has greater consistency of lifetime

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Extra Questions to be used in addition to those for the Foundation Tier

UNIT 10

Note: Solving quadratic equations by factorisation is now on the INTERMEDIATE TIER syllabus.

1. Solve the equations:

(a) $3x - 2 = 13$ (b) $9x + 13 = 4x + 18$ (c) $5 - 4x = 3 - 2x$

2. Expand and simplify the following:

(a) $(x + 1)(x + 2)$ (b) $(2x - 1)(2x + 1)$ (c) $(2x + 3)^2$
 (d) $(x + 4)(3 - 2x)$

3. Solve the simultaneous equations:

(a) $2x + 5y = 1$
 $x + y = 2$

(b) $3x + 4y = 2$
 $5x - 3y = 13$

4. Factorise each of the following:

(a) $10 - 25x$ (b) $14x^2 + 28x$ (c) $8x^3 + 4x^2$

5., Factorise each of the following:

(a) $x^2 - x - 2$ (b) $2x^2 + 7x + 3$ (c) $25x^2 - 1$

6. Solve the following quadratic equations:

(a) $2x^2 - 3x = 0$ (b) $x^2 + x - 6 = 0$ (c) $3x^2 - 13x - 10 = 0$

Answers

1. (a) 5 (b) 1 (c) 1 5. (a) $(x - 2)(x + 1)$ (b) $(2x + 1)(x + 3)$
 2. (a) $x^2 + 3x + 2$ (b) $4x^2 - 1$ (c) $(5x - 1)(5x + 1)$
 (c) $4x^2 + 12x + 9$ (d) $-2x^2 - 5x + 12$ 6. (a) $x = 0, \frac{3}{2}$ (b) $x = 2, -3$
 3. (a) $x = 3, y = -1$ (b) $x = 2, y = -1$ (c) $x = -\frac{2}{3}, 5$
 4. (a) $5(2 - 5x)$ (b) $14x(x + 2)$
 (c) $4x^2(2x + 1)$

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Intermediate Tier

Extra Questions to be used in addition to those for the Foundation Tier

UNIT 11

- You paid £240 for a computer, and then sold it for £210.
What was your loss as a percentage of the price you paid?
- In a sale, a video player was reduced from £160 to £136.
What was the percentage reduction?
- The price of a train ticket from Edinburgh to London was increased from £35 to £38.50.
What was the percentage increase?
- Calculate the following, giving your answer as simply as possible:

(a) $\frac{1}{5} - \frac{1}{6}$	(b) $\frac{2}{5} + \frac{5}{12}$	(c) $\frac{2}{5} \times \frac{10}{3}$	(d) $\frac{5}{8} \div \frac{3}{4}$
---------------------------------	----------------------------------	---------------------------------------	------------------------------------
- A recipe requires $\frac{1}{3}$ kg of sugar for a cake. How many cakes can be made with $1\frac{2}{3}$ kg sugar?
- The population of a country is increasing at a rate of 5% per year. If the population at the start of a year is 40 million, what is the population after

(a) one year,	(b) two years?
---------------	----------------
- After a 5% reduction in a sale, a TV costs £114. What was the original price?
- You sell a motorbike for £460. If the value has decreased by 8% since you bought it, how much did you pay for it?

Answers

- | | |
|---|---|
| 1. $12\frac{1}{2}\%$ | 5. 5 |
| 2. 15% | 6. (a) 42 million (b) 44.1 million |
| 3. 10% | 7. £120 |
| 4. (a) $\frac{1}{30}$ (b) $\frac{49}{60}$ (c) $\frac{4}{3}$ (d) $\frac{5}{6}$ | 8. £500 |

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Extra Questions to be used in addition to those for the Foundation Tier

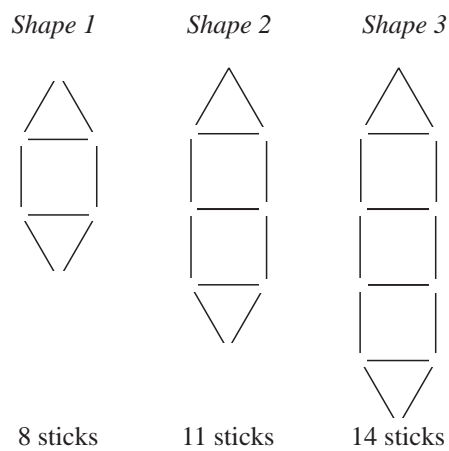
UNIT 12

1. Here are the first four terms of a number sequence:

5, 11, 17, 23

Write down the n th term of the sequence.

- 2.



The number of sticks forms a sequence.

- Write down a rule for finding the next number in the sequence.
 - Find a formula in terms of n for the number of sticks in the n th shape.
 - A shape requires 122 sticks. What number shape is this?
3. Write down the next two terms in this sequence:

1, 2, 4, 8, 16, ..., ...

What is the formula for the n th term in the sequence?

4. The n th term of the sequence

3, 8, 15, 24, 35, ..., ...

is of the form $an^2 + bn$. Find the values of a and b .

Answers

- | | |
|---|--------------------------------|
| 1. $6n - 1$ | 3. 32, 64: 2^{n-1} |
| 2. (a) add 3 to the previous term
(c) shape 39 | (b) $3n + 5$ 4. $a = 1, b = 2$ |

Quick Check**Intermediate Tier**

Extra Questions to be used in addition to those for the Foundation Tier

UNIT 13

1. Draw the line with equations

(a) $x + y = 2$ (b) $y - 2x = 5$

At what point will they intersect?

2. What is the equation of the line with gradient -1 and passing through the point $(3, 2)$?

3. The cost of removals, C in £, is given by

$$C = 10 + 5x$$

when x is the distance in miles travelled. Illustrate this relationship on a graph for $0 \leq x \leq 20$.

Use your graph to estimate the distance travelled when the cost is £86.

4. By drawing the graphs of the lines, for each pair of equations estimate the solutions of x and y .

(a) $2x + 5y = 20$ (b) $-2x + 5y = 20$

$3x + 2y = 12$ $2x - 2y = -7$

Answers

1. $x = -1, y = 3$

3. 15(15.2)

2. $y = 5 - x$

4. (a) $x \approx 1.8, y \approx 3.3$ (b) $x \approx 0.8, y \approx 04.3$

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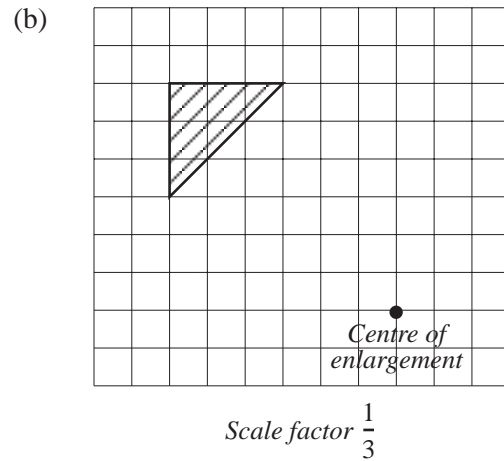
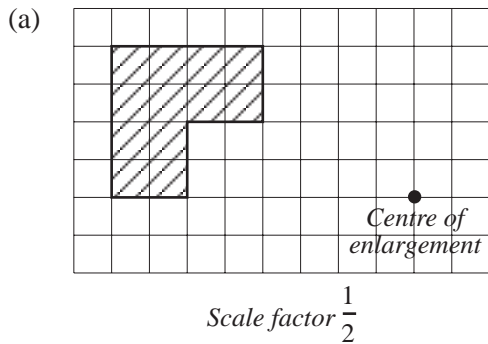
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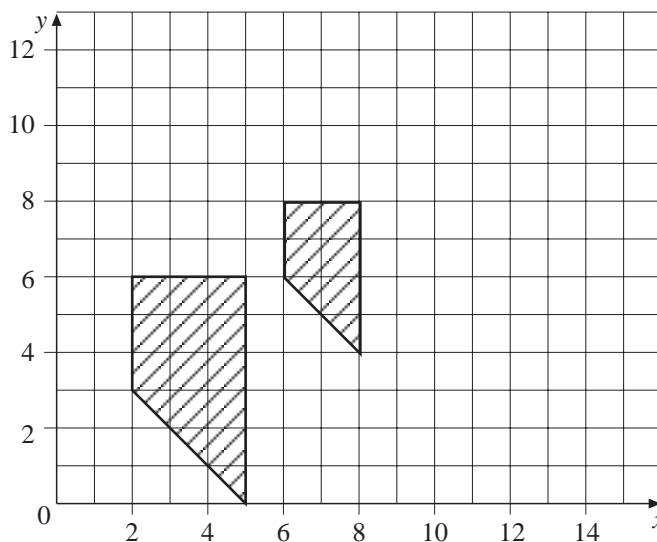
UNIT 14

*Please note that the section 14.14 (Enlargement with Negative Scale Factors) is **not** on the Intermediate Tier*

1. Copy each shape and enlarge, using the centre of enlargement shown and the given scale factor.



2. In the diagram below, the smaller shape has been obtained from the larger shape by an enlargement. State both the scale factor, and the coordinates of the centre of enlargement.

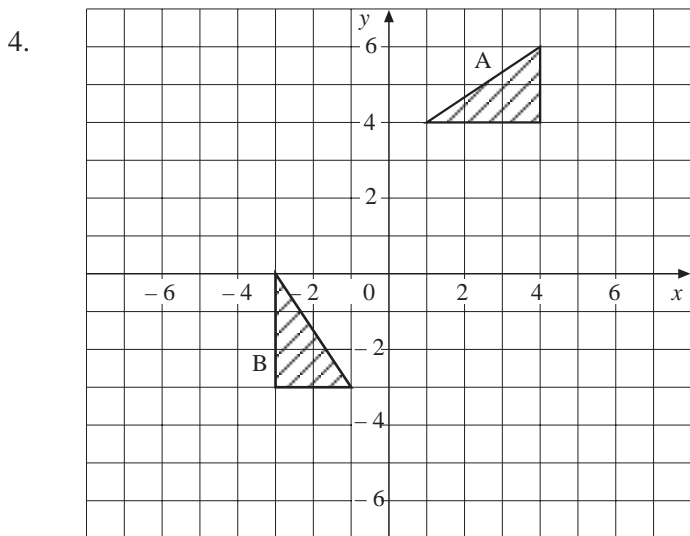


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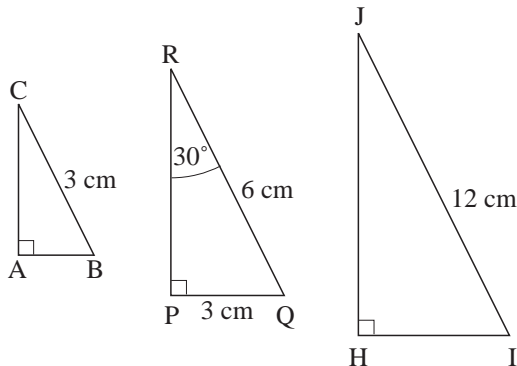
UNIT 14

3. Draw coordinates axes for $0 \leq x \leq 8$, $0 \leq y \leq 8$, and draw the triangle with vertices A (2, 5), B (5, 6) and C (2, 8). On the same diagram, draw the reflection of this triangle in the line $y = x$.

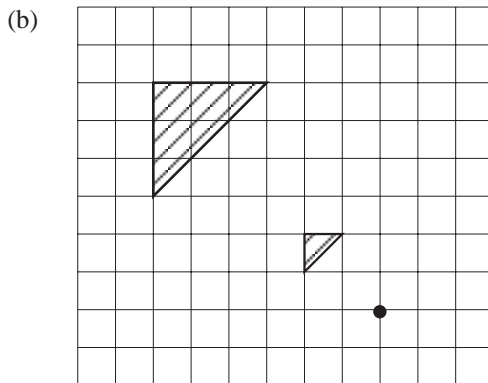
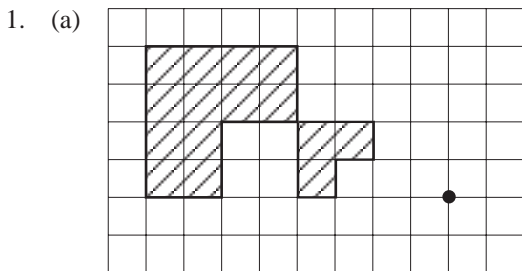


- (a) Triangle A is mapped to triangle B by means of a clockwise rotation, centre (0, 1), followed by a translation.
- What is the angle of rotation?
 - What is the column vector for the translation?
- (b) Triangle A may be mapped onto triangle B by means of a single rotation. What are the coordinates of the centre of rotation?

5. Triangles ABC, PQR and HIJ are all similar.
- Calculate the length AB.
 - What is the size of the angle B?
 - Calculate the length HJ.



Answers



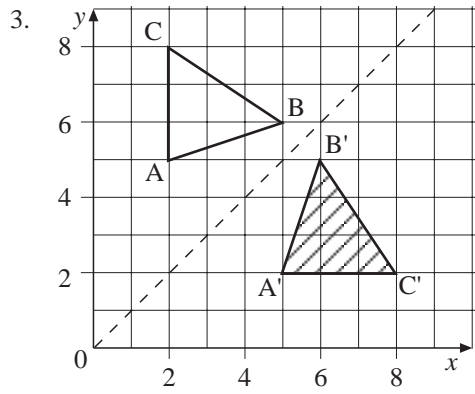
2. scale factor $\frac{2}{3}$, centre of enlargement (14, 12)

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UNIT 14

Answers



4. (a) (i) 90° (ii) $\begin{pmatrix} -6 \\ 0 \end{pmatrix}$

(b) $(-3, 4)$

5. (a) 1.5 cm (b) 60° (c) 10.4 cm (1 d.p.)

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UNIT 15

1. In a fruit yoghurt weighing 117 gm, the ratio of weight of fruit to weight of yoghurt is 2 : 7. Calculate the weight of fruit.
2. Dried flakes of apple, banana and apricot are mixed in the ratio 2 : 3 : 5 respectively by weight, to form a dried fruit mix. If the total weight of the mix is 150 grams, what is the weight of each type of fruit in the mix?

Answers

1. 26 grams
2. 30 gm, 45 gm, 75 gm, respectively

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UNIT 16

1. Solve the following inequalities:

(a) $1 + 4x < 13$ (b) $x^2 \leq 4$ (c) $(x - 2)(x - 1) \geq 0$

2. Solve the inequality:

$$x^2 - 2x - 3 < 0$$

3. Illustrate the region defined by the inequalities

$$x > 0 \quad y > x, \quad y < 4 - x$$

Shade and label the region R which is satisfied by all three inequalities. Write down the coordinates of the point with integer values which satisfies all three inequalities.

Answers

1. (a) $x < 3$ (b) $-2 \leq x \leq 2$

(c) $x \leq 1$ or $x \geq 2$

2. $-1 < x < 3$

