NAME: ……

Foundation/Higher GCSE Mathematics Revision Pack

SHAPE AND SPACE – NON-CALC

Q1.

Diagram **NOT** accurately drawn

(a) (i) Work out the size of the angle marked p.

.....°

(ii) Give a reason for your answer.

.....

(2)

Diagram **NOT** accurately drawn

(b) Work out the size of the angle marked q.

.....°

(1)

(Total 3 marks)

Q2.

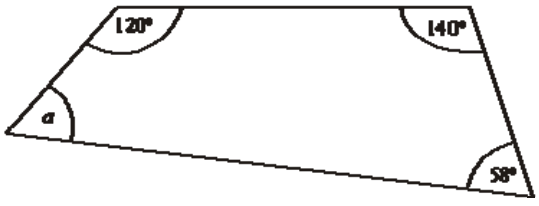


Diagram **NOT** accurately drawn

Work out the size of the angle *a*.

.....°

(Total 2 marks)

Q3.

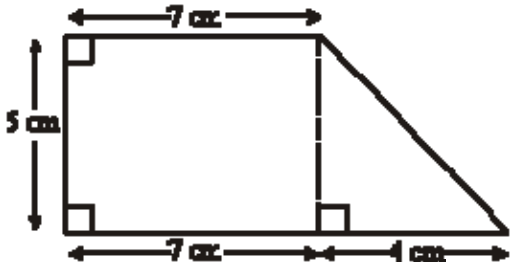


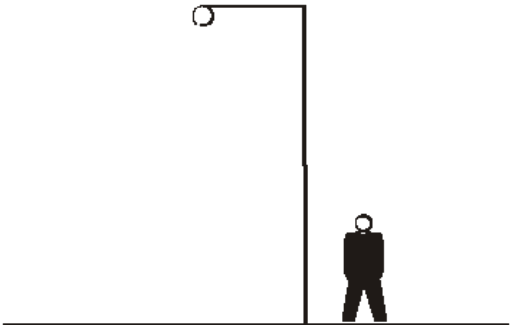
Diagram **NOT** accurately drawn

Work out the area of the shape.

..... cm^2

(Total 3 marks)

Q4.



The diagram shows a man standing next to a lamppost.
The man is of normal height.

(a) Write down an estimate for the height, in metres, of the man.

..... m

(1)

(b) Estimate the height, in metres, of the lamppost.

..... m

(2)

(Total 3 marks)

Q5.

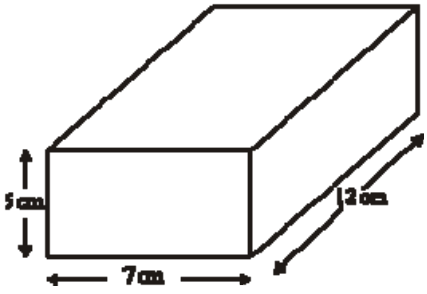


Diagram **NOT** accurately drawn

Work out the volume of the cuboid.

Q6.

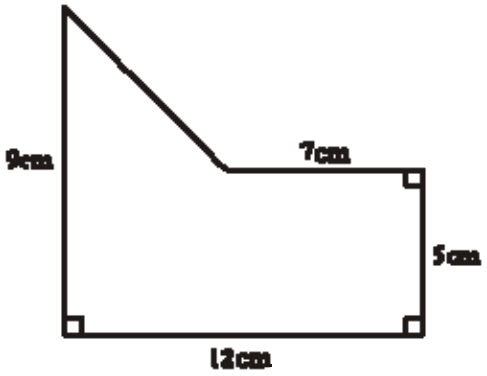


Diagram **NOT** accurately drawn

Work out the area of the shape.

..... cm^2

(Total 4 marks)

..... cm^3

(Total 2 marks)

Q7.

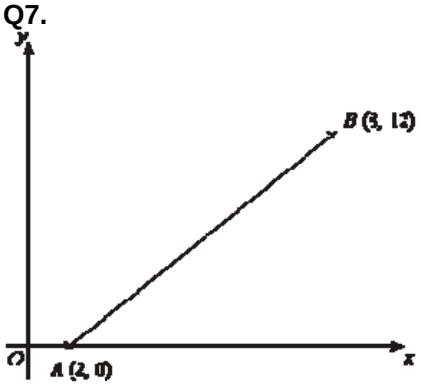


Diagram **NOT** accurately drawn

A is the point (2, 0).

B is the point (8, 12).

Work out the coordinates of the midpoint of AB.

(..... , ...)

(Total 2 marks)

Q8.

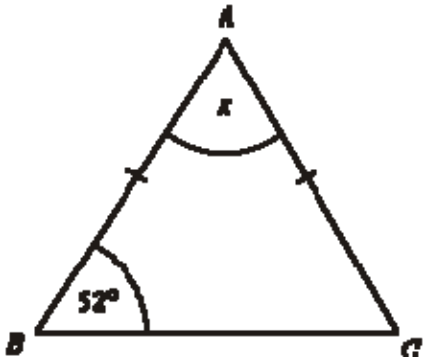


Diagram **NOT** accurately drawn

In the diagram,
$AB = AC$,
Angle $ABC = 52°$.

(a) Work out the size of the angle marked x.

..... °

(2)

(b) Give a reason for your answer.

.....
..

(1)
(Total 3 marks)

Q9.

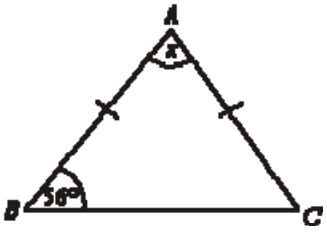


Diagram **NOT** accurately drawn

The diagram shows an isosceles triangle.
$AB = AC$
Angle $CBA = 56°$

(a) Work out the size of the angle marked x.

.....°

(2)

(b) Give reasons for your answer.

.....
.

(1)

(Total 3 marks)

Q10.

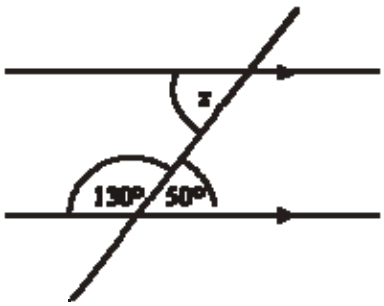


Diagram **NOT** accurately drawn

(a) Write down the size of the angle marked x.

.....°

(1)

(b) Give a reason for your answer.

.....
..

(1)
(Total 2 marks)

Q11.

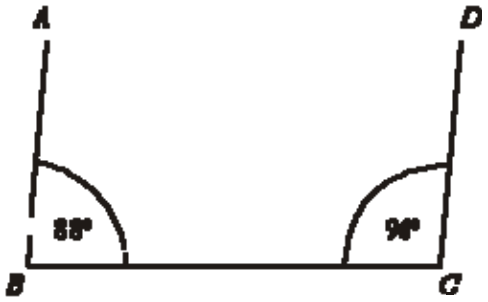


Diagram **NOT** accurately drawn

James says, "The lines AB and DC are parallel."

Ben says, "The lines AB and DC are **not** parallel."

Who is right, James or Ben?

.....

Give a reason for your answer.

.....
.

.....
.

(Total 2 marks)

Q12. The length of a line is 63 centimetres, correct to the nearest centimetre.

(a) Write down the **least** possible length of the line.

..... centimetres

(1)

(b) Write down the **greatest** possible length of the line.

..... centimetres

(1)
(Total 2 marks)

Q13. John travelled 30 km in 1.5 hours.
Kamala travelled 42 km in 2 hours.

Who had the greater average speed?
You must show your working.

.....

(Total 3 marks)

Q14.

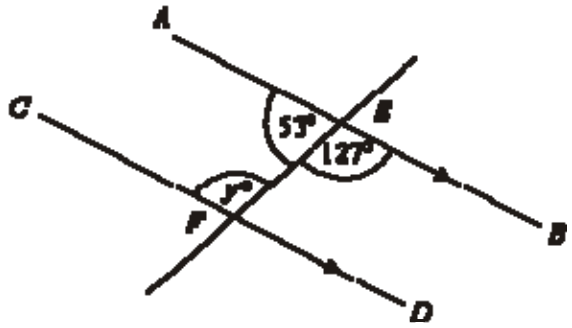


Diagram **NOT** accurately drawn

AB is parallel to CD.
Angle BEF = 127°.

(i) Write down the value of y.

y = ...

(ii) Give a reason for your answer.

.....
..

(Total 2 marks)

Q15. The diagram shows a prism.

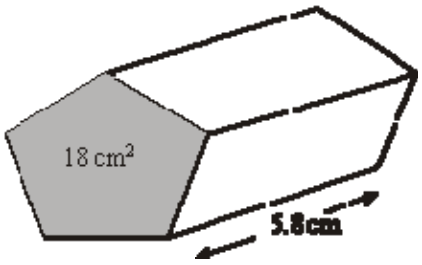


Diagram **NOT** accurately drawn

The area of the cross section of the prism is 18 cm^2.
The length of the prism is 5.8 cm.

Work out the volume of the prism.

..... cm^3

(Total 2 marks)

Q16.

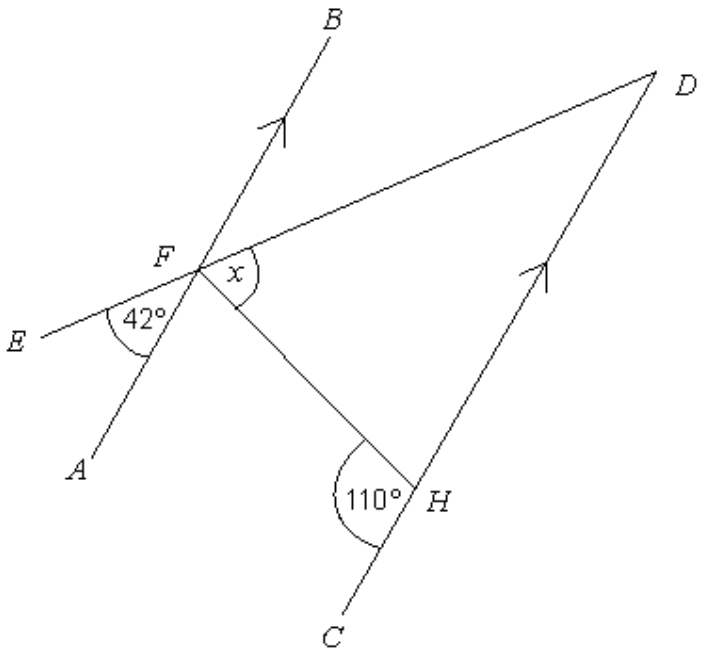


Diagram **NOT** accurately drawn

AFB and CHD are parallel lines.
EFD is a straight line.

Work out the size of the angle marked x.

x = ...°

(Total 3 marks)

Q17.

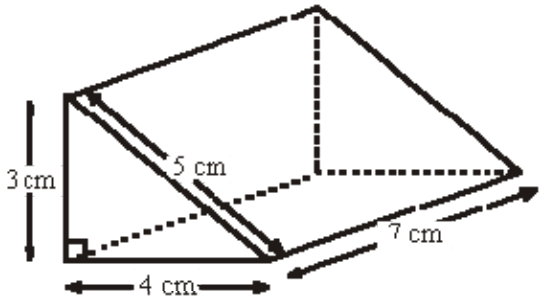


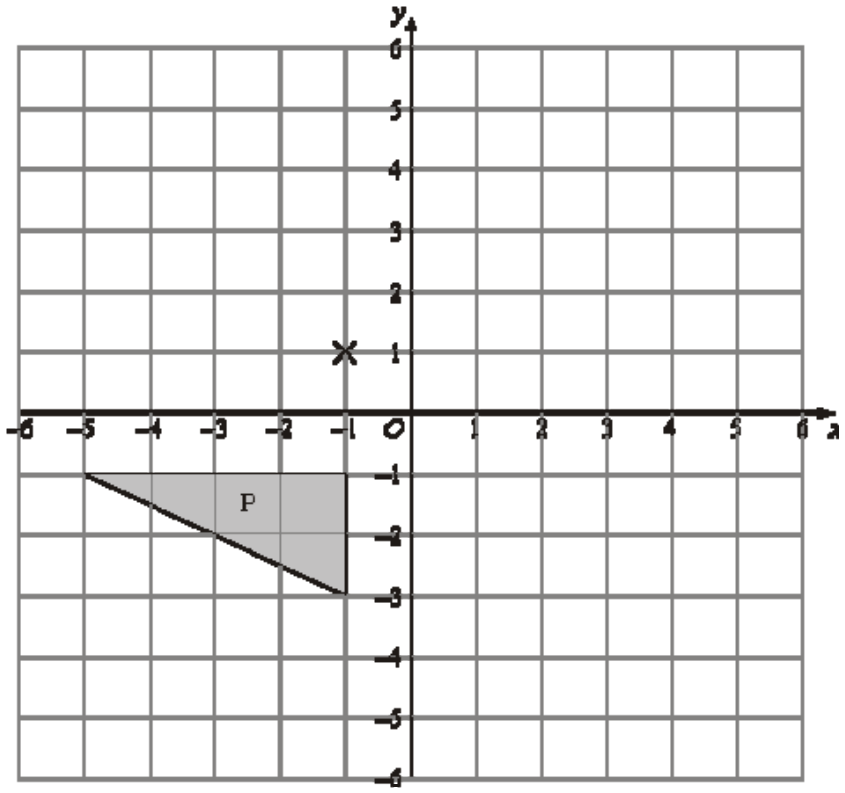
Diagram **NOT** accurately drawn

Work out the total surface area of the triangular prism.
Give the units with your answer.

.....

(Total 4 marks)

Q18.



(a) Rotate triangle **P** 180° about the point (–1, 1).

Label the new triangle **A**.

(2)

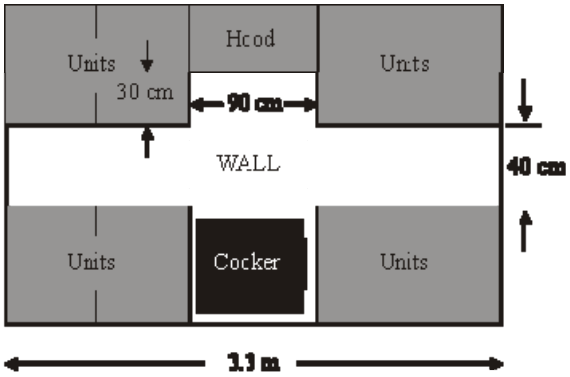
(b) Translate triangle **P** by the vector $\begin{pmatrix} 0 \\ -1 \end{pmatrix}$.

Label the new triangle **B**.

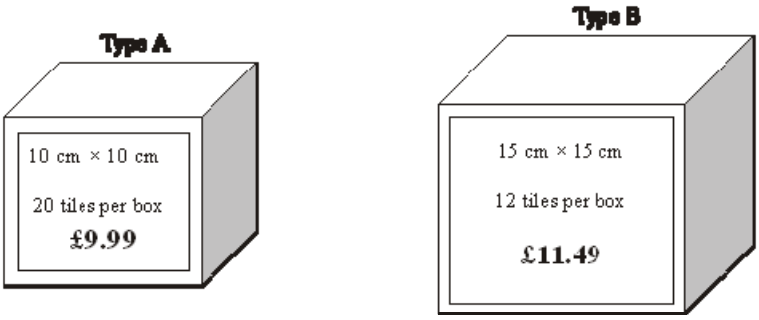
(1)
(Total 3 marks)

Q19. The diagram shows a wall in Jenny's kitchen.

Diagram **NOT** accurately drawn



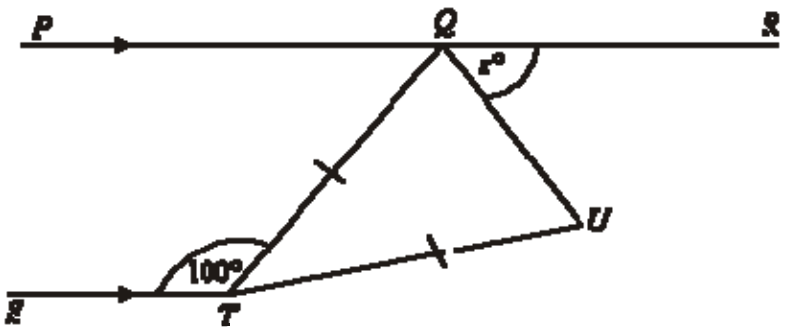
Jenny wishes to tile this wall in her kitchen.
She chooses between the two types of tile shown below.



Which tiles should Jenny use to spend the least amount of money on tiling the wall?
You must show all of your working.

(Total 6 marks)

Q20.



PQR is a straight line parallel to *ST.*
QT = *UT*
Angle *STQ* = 100°.

Prove that angle $QTU = (2x - 20)°$.

(Total 5 marks)

Q21. Sarah goes to the gym on her way to work.
The table shows what she wants to do before arriving at work.

Activity	Time (mins)
Drive from home to gym	10
Exercise at gym	45
Shower and change	20
Drive from gym to work	25

She has to arrive at work at 08 50

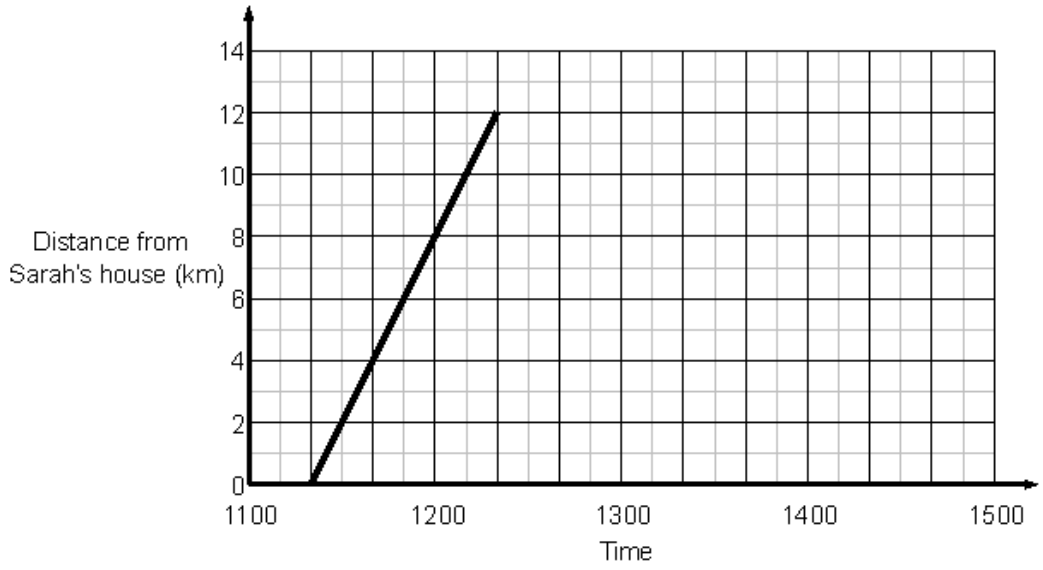
(a) What is the latest time she can leave home?

.....

(3)

Each Saturday, Sarah cycles from her house to the gym.

The travel graph shows Sarah's journey to the gym.



(b) What time does she leave home?

.....

(1)

(c) How far is the gym from Sarah's house?

..... km

(1)

Sarah stays at the gym for $1\frac{1}{2}$ hours.

She then cycles back to her house at 18 km/h.

(d) Complete the travel graph.

(3)
(Total 8 marks)

Q22. Mrs Kunal's garden is in the shape of a rectangle.
Part of the garden is a patio in the shape of a triangle.
The rest of the garden is grass.

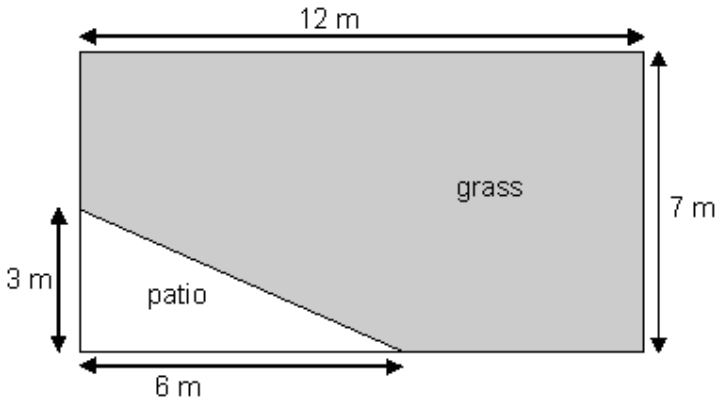


Diagram **NOT** accurately drawn

Mrs Kunal wants to spread fertiliser over all her grass.

One box of fertiliser is enough for 32 m^2 of grass.

How many boxes of fertiliser will she need?
You must show your working.

.....

(Total 4 marks)

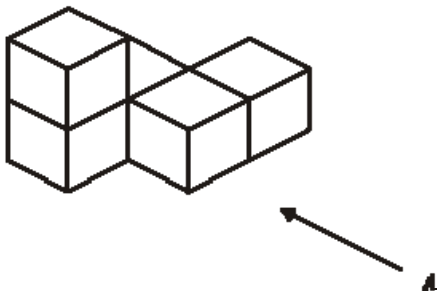
Q23. Stuart drives 180 km in 2 hours 15 minutes.

Work out Stuart's average speed.

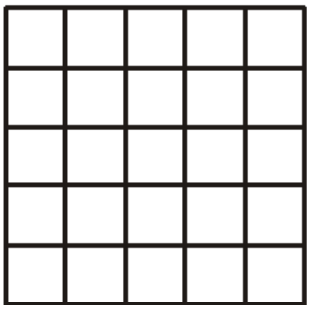
..... km/h

(Total 3 marks)

Q24. The diagram represents a solid made from 5 identical cubes.

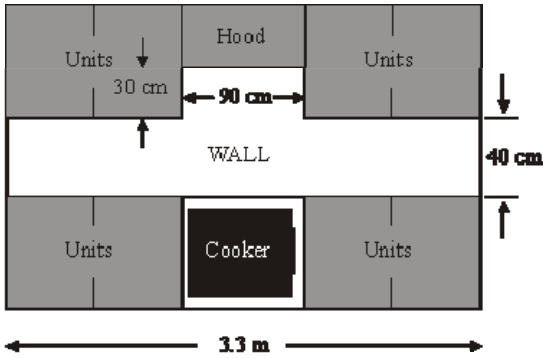


On the grid below, draw the view of the solid from direction A.

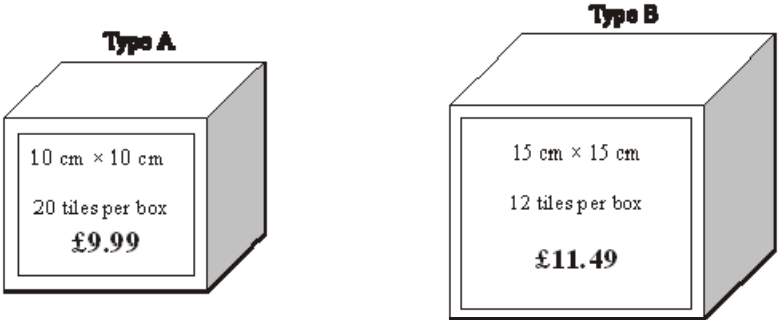


Q25. The diagram shows a wall in Jenny's kitchen.

Diagram **NOT** accurately drawn



Jenny wishes to tile this wall in her kitchen.
She chooses between the two types of tile shown below.



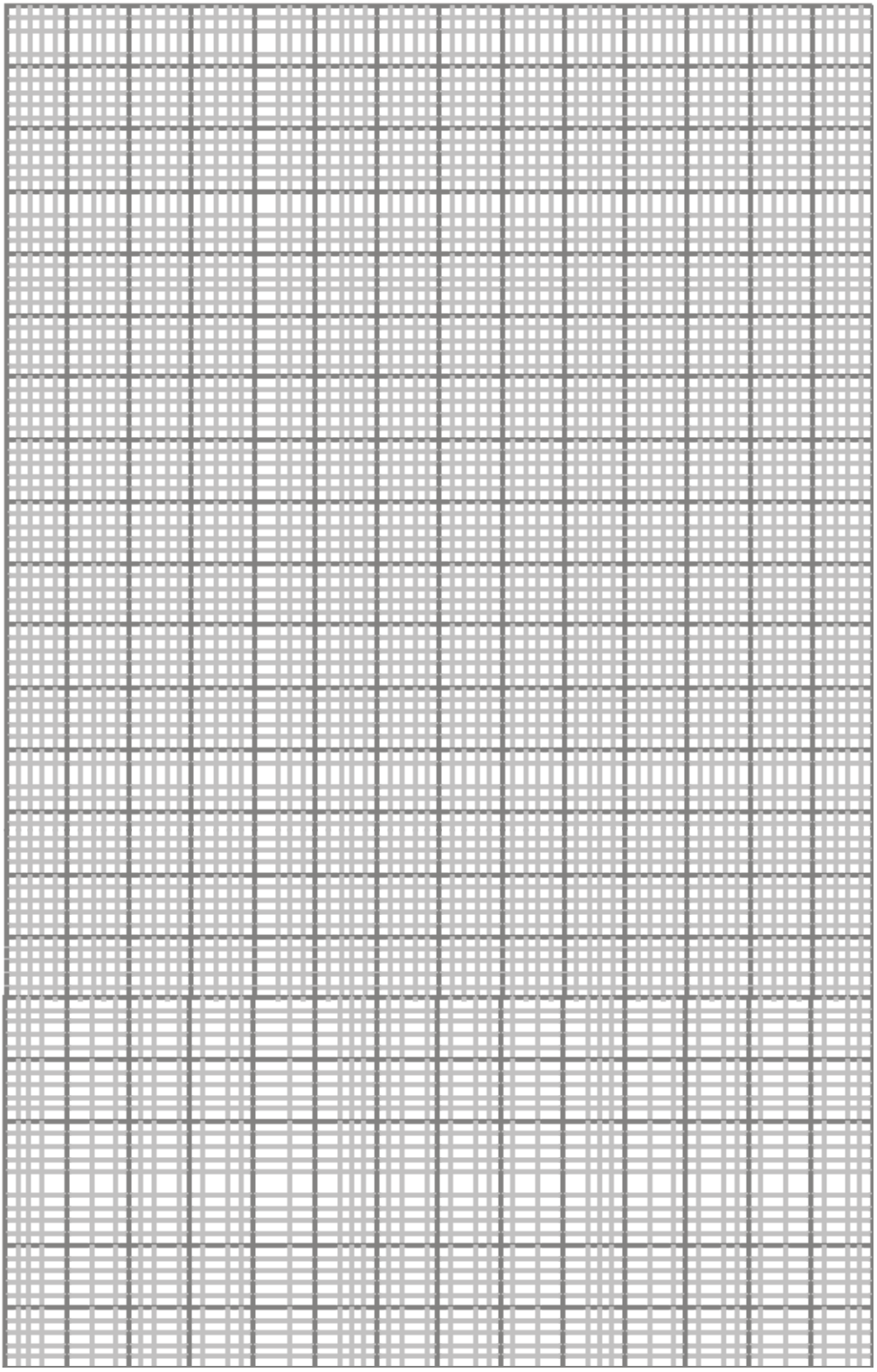
(a) Which tiles should Jenny use to spend the least amount of money on tiling the wall?

You must show all of your working.

(6)

A Box of Type A tiles has dimensions 10.5 cm × 10.5 cm × 21 cm.
Readypac wants to produce cartons which hold 12 boxes of Type A tiles, when full.

(b) On the grid below, design a net of a carton that Readypac could use.



(3)

(Total 9 marks)

Q26.

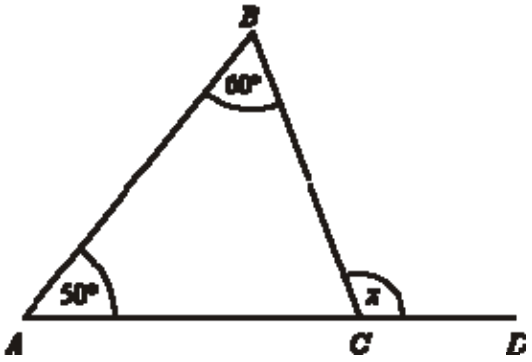


Diagram **NOT** accurately drawn

In the diagram, ABC is a triangle.
ACD is a straight line.
Angle CAB = 50°.
Angle ABC = 60°.

Work out the size of the angle marked x

.....°

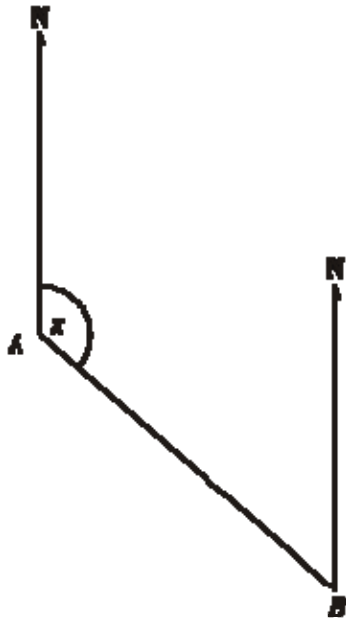
(Total 2 marks)

Q27. In the space below, use ruler and compasses to **construct** an equilateral triangle with sides of length 6 centimetres.
You must show all your construction lines.

One side of the triangle has already been drawn for you.

(Total 2 marks)

Q28. The diagram shows the position of two airports, A and B.
A plane flies from airport A to airport B.



Scale: 1 cm represents 50 km

(a) Measure the size of the angle marked *x*.

..... °

(1)

(b) Work out the real distance between airport *A* and airport *B*.
Use the scale 1 cm represents 50 km.

..... km

(2)

Airport C is 350 km on a bearing of 060° from airport B.

(c) On the diagram, mark airport *C* with a cross (×).
Label it *C*.

(2)
(Total 5 marks)

Q29.

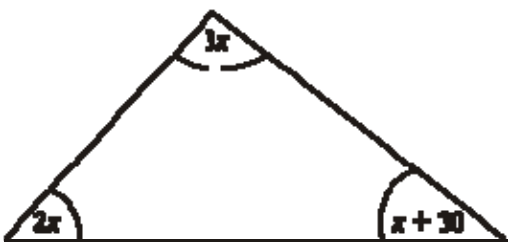


Diagram **NOT** accurately drawn

The diagram shows a triangle.
The sizes of the angles, in degrees, are

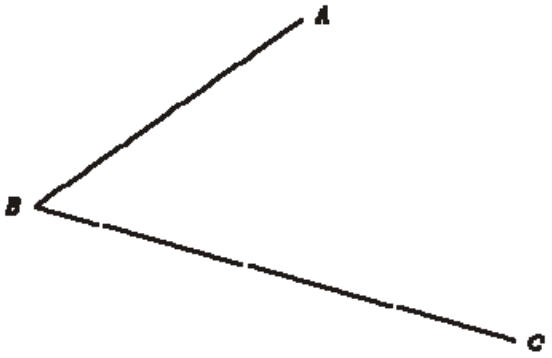
$3x$
$2x$
$x + 30$

Work out the value of x.

x= .....

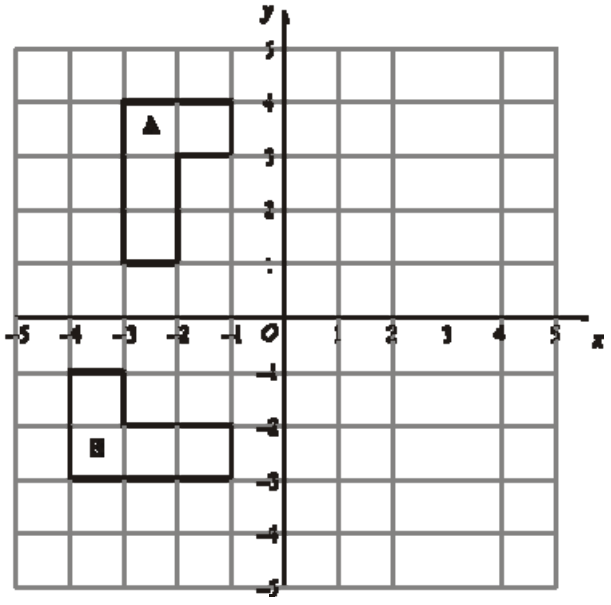
(Total 3 marks)

Q30. Use ruler and compasses to construct the bisector of angle ABC.
You must show all your construction lines.



(Total 2 marks)

Q31.



(a) Reflect shape **A** in the y axis.

(2)

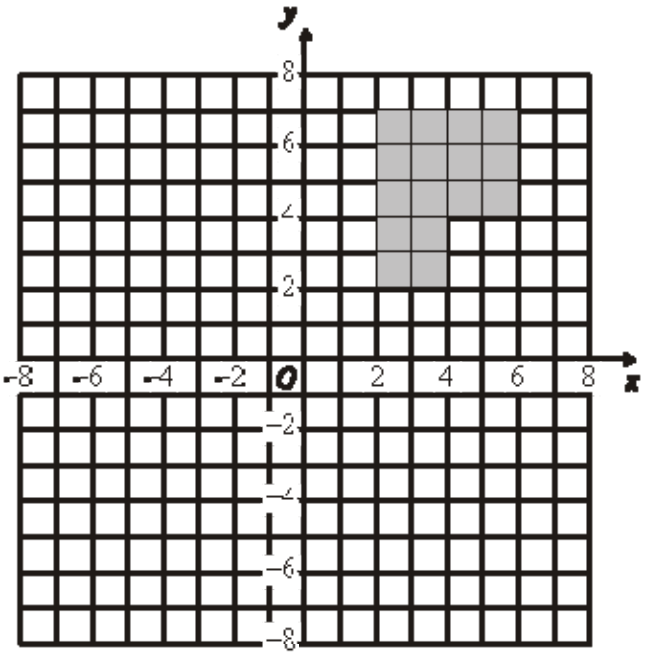
(b) Describe fully the **single** transformation which takes shape **A** to shape **B**.

(3)

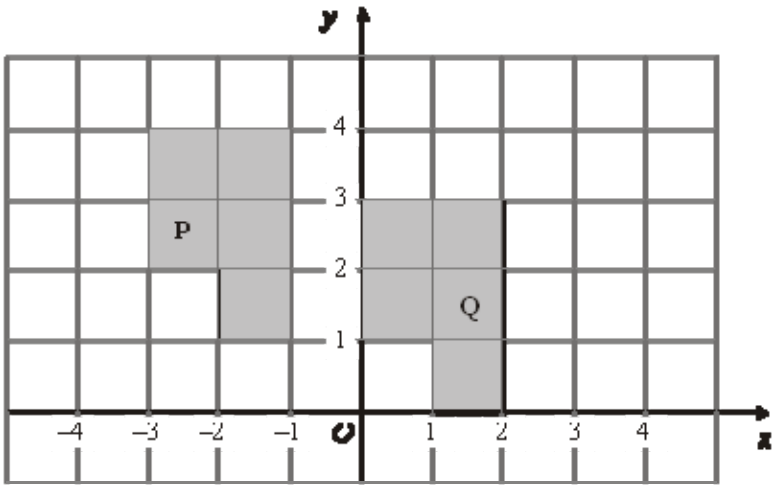
(Total 5 marks)

Q32.

(a) Rotate the shaded shape 90° clockwise about the point *O*.



(2)



(b) Describe fully the single transformation that will map shape **P** onto shape **Q**.

.....

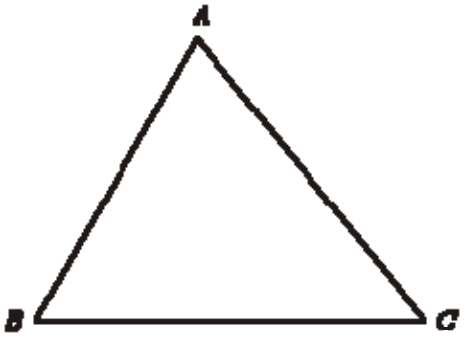
..

(2)

(Total 4 marks)

(Total 2 marks)

Q33.



ABC is a triangle.

Shade the region inside the triangle which is **both**

less than 4 centimetres from the point B **and** closer to the line AC than the line AB.

(Total 4 marks)

Q34.

Diagram **NOT** accurately drawn

The diagram shows part of a **regular** 10-sided polygon.

Work out the size of the angle marked *x*.

.....°

(Total 3 marks)

Q35. There are 40 litres of water in a barrel.

The water flows out of the barrel at a rate of 125 millilitres per second.

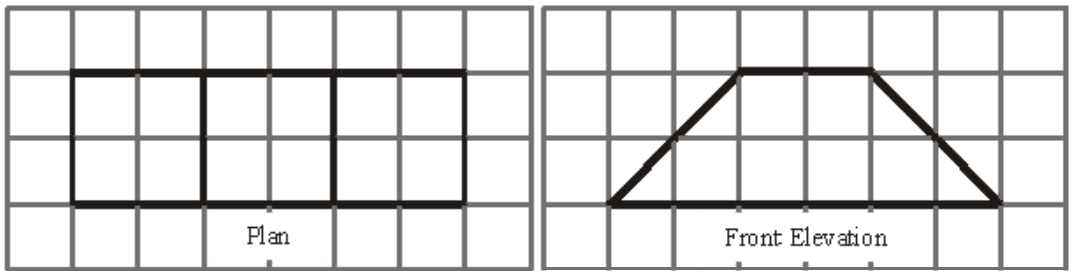
1 litre = 1000 millilitres.

Work out the time it takes for the barrel to empty completely.

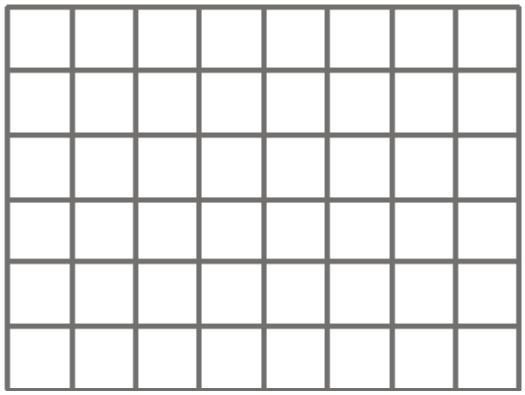
..... seconds

(Total 3 marks)

Q36. Here are the plan and front elevation of a solid shape.



(a) On the grid below, draw the side elevation of the solid shape.



(2)

(b) In the space below, draw a sketch of the solid shape.

(2)

(Total 4 marks)

Q37.

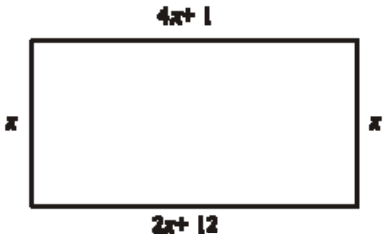


Diagram **NOT** accurately drawn

The diagram shows a rectangle.
All the measurements are in centimetres.

(a) Explain why $4x + 1 = 2x + 12$

(1)

(b) Solve $4x + 1 = 2x + 12$

$x =$ .....

(2)

(c) Use your answer to part (b) to work out the perimeter of the rectangle.

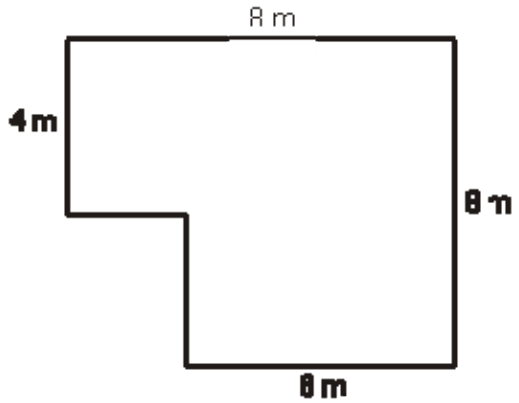
..... cm

(2)

(Total 5 marks)

Q38.

Diagram **NOT** accurately drawn



The diagram is a plan of the floor of Nikola's room.
All the angles are right angles.
Nikola is going to lay flooring to cover all the floor.

She can choose either carpet tiles or wood strips.

Carpet tiles come in packs of 32 and are square. They measure 50 cm by 50 cm.
Wood strips come in packs of 10 and are rectangular. They measure 2 m by 25 cm.

She only wants to use one type of flooring and buy as few packs as she can.
Which type of flooring should she choose?

.....

(Total 6 marks)

M1

	Answer	Mark	Additional Guidance
(a)	56 Reason	2	B1 56° cao B1 sum of angles on a straight line is 180°
(b)	22	1	**B1** cao
			Total for Question: 3 marks

M2.

Working	Answer	Mark	Additional Guidance
360 – (120 + 140 + 58)	42	2	**M1** 360 – "(120 + 140 + 58)" or equivalent) or for (a + 58 + 120 + 140 = 360) oe seen **A1** cao

			[Note: The subtraction MUST be from 360]
			Total for Question: 2 marks

M3.

Working	Answer	Mark	Additional Guidance
$5 \times 7 + \frac{1}{2} \times 4 \times 5$ $= 35 + 10 =$ or $\frac{6 \times (7+7+4)}{2} - \frac{6 \times 18}{2} =$	45	3	**M1** for 5×7 or for $\frac{1}{2} \times 4 \times 5$ **M1** for $5 \times 7 + \frac{1}{2} \times 4 \times 5$ **A1** for 45 cao Alt.: **M2** for $\frac{6 \times (7+7+4)}{2}$
			Total for Question: 3 marks

M4.

	Answer	Mark	Additional Guidance
(a)	1.5 – 2.0	1	**B1** 1.5 – 2.0m inclusive (accept imperial equivalent, where units have been changed in the range 5'6" to 6'6")
(b)	4.5 – 6.0	2	**M1** ft from their evidence of use of man as a scale in the range 2.5 to 3 (With or Without Working) **A1** ft from (a) or 4.5 – 6.0 inclusive
			Total for Question: 3 marks

M5.

Working	Answer	Mark	Additional Guidance
$5 \times 7 \times 12$	420	2	**M1** for $5 \times 7 \times 12$ **A1** for 420 cao
			Total for Question: 2 marks

M6.

Working	Answer	Mark	Additional Guidance
Splits up shape e.g. into rectangle and triangle 12×5 (=60) $\frac{1}{2} \times 5 \times 4$	70	4	**M1** for splitting up shape by drawing straight lines or for two or more attempts to find the area of parts of the shape **M1** (dep) for a correct method to find area of one part, e.g. 12×5 or 60 **M1** for a correct method to find area of another part(s), e.g. $\frac{1}{2}$ × "5" × "4" or 10 **A1** cao
			Total for Question: 4 marks

M7.

Working	Answer	Mark	Additional Guidance
BDF = 42° GFB = 110° 110 – 42	68	3	**M1** for EDC = 42 or DHF = 180–110 (=70) **M1** for 180 – 42 – 70 **A1** cao **OR** **M1** for BFD = 42° or BFH = 110° **M1** for 110 – 42 **A1** cao **OR** **M1** for AFH = 180 – 110 (=70°) **M1** for 180 – 70 – 42 **A1** cao
			Total for Question: 3 marks

M8.

	Working	Answer	Mark	Additional Guidance
(a)	180 – 2 × 52 =	76	2	**M1** for 180 – '2 × 52' **A1** for 76 cao
(b)		reason	1	**B1** for isosceles or angles in a triangle sum to 180°
				Total for Question: 3 marks

M9.

	Working	Answer	Mark	Additional Guidance
(a)	180 – 56 – 56	68	2	**M1** for use of two base angles in an isosceles triangle or sight of 56 marked on diagram for angle C. This may be given for 112º seen **A1** cao
(b)	Base angles of isosceles triangle are equal Sum of angles in a triangle is 180° (oe)	Full reasons	1	**B1** for Two(base) angles or B and C (in an isosceles triangle are) equal or two equal sides so two equal angles or equal angles are opposite equal sides **and** (Angles) in a triangle (add to) 180º
				Total for Question: 3 marks

M10.

Working	Answer	Mark	Additional Guidance

$\frac{30}{1.5}$ =20 $\frac{42}{2}$ = 21	Kamala	3	**M1** for $\frac{30}{1.5}$ or $\frac{42}{2}$ (accept minutes) **A1** for 20 and 21 **A1** for Kamala cao Note: answer only scores M0 A0 A0 **Alternative method:** **M1** for 10 km in 0.5 hours **A1** for 40 km in 2 hours **A1** for Kamala cao **OR** **M1** for 10.5 km in 0.5 hours **A1** for31.5 km in 1.5 hours **A1** for Kamala cao **OR** **M1** for 60 km in 3 hours or 63 km in 3 hours **A1** for 60 km in 3 hours and 63 km in 3 hours **A1** for Kamala cao **OR** **M1** for 10 km in 30 minutes or 10.5 km in 30 minutes **A1** for 60 km in 30 minutes and 10.5 km in 30 minutes **A1** for Kamala cao
			Total for Question: 3 marks

M11.

Answer	Mark	Additional Guidance
Ben with a valid reason	2	**B2** for Ben and a valid reason, eg 'it should be 180' or 'they are not supplementary (allied, co-interior)' oe This could be implied by 184 or 84 or 92 seen [**B1** for Ben and 88 + 96 or 180 – 88 or 180 – 96 seen or for just a valid reason given (eg without Ben or with James)]
		Total for Question: 2 marks

M12.

	Answer	Mark	Additional Guidance
(a)	62.5	1	**B1** cao
(b)	63.5	1	**B1** for 63.5 (accept 63,49 or 63.49.. or any evidence that the 9 is recurring or 63.499 or better)
			Total for Question: 2 marks

M13.

	Answer	Mark	Additional Guidance
(a)	50	1	**B1** for 50 cao
(b)	Alternate (angles)	1	**B1** for alternate (angles) or co-interior (angles) or allied (angles) or any complete reason. (accept Z angles)
			Total for Question: 3 marks

M14.

	Answer	Mark	Additional Guidance
(i)	127	2	**B1** for 127
(ii)	Alternate angles		**B1** for alternate angles (accept Z angles) or allied angles (co-interior angles) (= 180) or corresponding angles (accept F angles) **and** (vertically) opposite angles or corresponding angles (accept F angles) **and** angles on a straight line (= 180º) or allied angles (co-interior angles) **and** angles on a straight line (= 180º)
			Total for Question: 2 marks

M15.

Working	Answer	Mark	Additional Guidance
18 × 5.8 =	104.4	2	**M1** for 18 × 5.8 **A1** for 104.4 cao
			Total for Question: 2 marks

M16.

Working	Answer	Mark	Additional Guidance
$\frac{1}{2}$ (3 × 4) × 2 + (3 × 7) + (4 × 7) + (5 × 7) = 12 + 21 + 28 + 35	96 cm^2	4	**M1** for $\frac{1}{2}$ (3 × 4) or 3 × 7or 5 × 7or 4 × 7 **M1** for attempt to add 5 faces which are areas **A1** for 96 **B1** (indep) for cm^2 (NB: 0 marks for calculating volume)
			Total for Question: 4 marks

M17.

	Working	Answer	Mark	Additional Guidance
(a)	Triangle A	Triangle	2	**B2** for triangle with vertices

		with vertices (–1,5), (–1, 3), (3, 3)		(–1, 5), (–1, 3), (3, 3) (**B1** for triangle with correct orientation or for triangle rotated ±90° centre (–1, 1))
(b)	Triangle B	Triangle with vertices (1, –2), (5, –2), (5, –4)	1	**B1** for triangle with vertices (1, –2), (5, –2), (5, –4)
(c)	Triangle C	Triangle with vertices (1, 1.5), (1, 4), (2, 4)	2	**B2** for triangle with vertices (1, 1.5), (1, 4), (2, 4) (**B1** for the triangle with correct orientation or for any two of the vertices (1, 1.5), (1, 4), (2, 4)) SC: **B1** for a triangle with vertices (1, 1.5), (1, k), (2, k)
				Total for Question: 5 marks

M18.

	Working	Answer	Mark	Additional Guidance
QWC (ii, iii) **FE**	330 ÷ 10 = 33 A tiles per long row 40 ÷ 10 = 4 long rows 33 × 4 = 132 tiles 90 ÷ 10 = 9 tiles per short row 30 ÷ 10 = 3 short rows 9 × 3 = 27 tiles 132 + 27 = 159 tiles No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 330 ÷ 15 = 22 B tiles per long row 40 ÷ 15 = 3 long rows (1 row of tiles will be cut) 22 × 3 = 66 A tiles 90 ÷ 15 = 6 tiles per short row 30 ÷ 15 = 2 short rows 6 × 2 = 12 tiles 66 + 12 = 78 tiles No of boxes needed = 7 (12 × 7 = 84 tiles) £11.49 × 7 = £80.43 **OR**	Tile A is the most economical	6	**M1** for 330 ÷ 10 or 90 ÷ 10 or 330 ÷ 15 or 90 ÷ 15 **A1** for (33 and 9) or (22 and 6) **M1** for 33 × 4 + 9 × 3 or 22 × 3 + 6 × 2 **A1** ft for 10 A boxes needed ('33 × 4' ÷ '9 × 3') ÷ 20 rounded up to nearest whole number) or for 7A boxes needed ('22 × 3' ÷ '6 × 2') ÷ 12 rounded up to nearest whole number) **B1** for answers or £79.92 and £80.43 to justify the choice **C1** for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable** **OR**

	Wall area = 330 × 40 + 90 × 30 = 13200 + 2700 = 15900 cm^2 Tile A area = 10 × 10 = 100 cm^2 No of tiles = 15900 ÷ 100 = 159 No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 Tile B area = 15 × 15 = 225 cm^2 No of tiles = 15900 ÷ 225 = 70(225 × 70 = 15700) + 1 No of boxes needed = 6 (12 × 6 = 72 tiles) but some tiles will need to be cut, so 7 boxes needed £11.49 × 7 = £80.43			**M1** for either 330 × 40 or 90 × 30 or 10 × 10 or 15 × 15 **A1** for 15900 and (100 or 225) **M1** for 15900 ÷ 100 or 15900 ÷ 225 **A1** ft for 10 A boxes needed ('15900' ÷ '100') ÷ 20 rounded up to nearest whole number) or 7 B boxes needed ('15900' ÷ '225') ÷ 12 rounded up to nearest whole number) **B1** for answers or £79.92 and £80.43 to justify the choice **C1** for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable**
				Total for Question: 6 marks

M20.

	Working	Answer	Mark	Additional Guidance
QWC (i, ii, iii)	Angle RQT= 100° (alternate angles are equal) Angle TQU = 100 – x Angle QUT = 100 – x (base angles of isos triangle) Angle QTU = 180 – (100 – x + 100 – x) angles in a triangle)	Proof	5	**B1** for angle RQT = 100° **B1** for angle TQU = 100 – x or angle QUT = 100 – x **B1** for completing the proof **C2** for all 3 reasons given **QWC: Proof should be clearly laid out with technical language correct, e.g. alternate angles are equal** [C1 for just 1 or 2 reasons given] **QWC: Proof should be clearly laid out with technical language correct, e.g. alternate angles are equal**
				Total for Question: 5 marks

M21.

	Working	Answer	Mark	Additional Guidance
(a)	10 + 45 + 20 + 25 = 100 1 hour 40 minutes	07 10	3	**M1** for 10 + 45 + 20 + 25 or 100 seen **M1** for correct attempt to convert to hours and minutes **A1** cao **OR** **M2** for clear attempt to subtract all times from 08 50 (may be seen as working backwards) (M1 for clear attempt to take at least one time away from 08 50) **A1** cao
(b)		11 20	1	**B1** for 11 20 **or** twenty past eleven oe
(c)		12	1	**B1** cao
(d)		Straight line from (12 20, 12) to (13 50, 12) and from (13 50, 12) to (14 30, 0)	3	**M1** for straight line segment on graph **M1** for straight line with negative segment **A1** for correct graph **or** **M1** for straight line segment on graph **M1** for 12 ÷ 18 oe or 40 minutes seen **A1** for correct graph SC: B2 for the correct straight line translated to left or right
				Total for Question: 8 marks

M22.

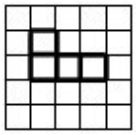
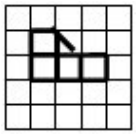
Working	Answer	Mark	Additional Guidance
12 × 7 = 84 $84-\frac{1}{2}(3\times6)$ 75 ÷ 32	3	4	**M1** for 12 × 7 (= 84) **M1** for $"84"-\frac{1}{2}(3\times6)$ (= 75) **M1** for "area"÷ 32 or (32, 64,) 96 seen with "area" calculated. **A1** cao (dep on all M marks) **or** **M1** for 12 × 4 (= 48) **M1** for $"48"+\frac{1}{2}(12+6)\times3$ **M1** for "area"÷ 32 or (32, 64,) 96 seen with "area" calculated. **A1** cao (dep on all M marks) **M1** for $6\times3+\frac{1}{2}(3\times6)$ (= 27)

			M1 for "27" + 12 × 4 **M1** for "area" ÷ 32 or (32, 64,) 96 seen with "area" calculated. **A1** cao (dep on all M marks)
			Total for Question: 4 marks

M23.

Working	Answer	Mark	Additional Guidance
180 ÷ 2.25	80	3	**M1** for 180 ÷ 2 hr 15 mins or 180 ÷ 2.15 or 180 ÷ 135 **M1** for 180 ÷ 2.25 or 180 ÷ 2¼ or "1.3(33)" × 60 **A1** for 80 SC **B1** for 83.72 or $\frac{3600}{43}$ or 1.3(333…)
			Total for Question: 3 marks

M24.

Answer	Mark	Additional Guidance
 **OR** 	2	**B2** For either answer (**B1** for an "L" shape with one dimension correct) Internal lines need not be drawn. All 3-D drawings get B0
		Total for Question: 2 marks

M25.

		Working	Answer	Mark	Additional Guidance
QWC (i, ii, iii) **FE**	(a)	Wall area = 330 × 40 + 90 × 30 = 13200 + 2700 = 15900 cm^2 Tile A area = 10 × 10 = 100 cm^2 No of tiles = 15900 ÷ 100 = 159 No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92	Tile A is the most economical	6	**M1** for either 330 × 40 or 90 × 30 or 10 × 10 or 15 × 15 **A1** for 15900 and (100 or 225) **M1** for 15900 ÷ 100 or 15900 ÷ 225 **A1** ft for 10 A boxes needed ('15900' ÷ '100') ÷ 20 rounded up to nearest whole number) or 7 B

		Tile B area = 15 × 15 = 225 cm^2 No of tiles = 15900 ÷ 225 = 70(225 × 70 = 15700) + 1 No of boxes needed = 6 (12 × 6 = 72 tiles) but some tiles will need to be cut, so 7 boxes needed £11.49 × 7 = £80.43 **OR** 330 ÷ 10 = 33 A tiles per long row 40 ÷ 10 = 4 long rows 33 × 4 = 132 tiles 90 ÷ 10 = 9 tiles per short row 30 ÷ 10 = 3 short rows 9 × 3 = 27 tiles 132 + 27 = 159 tiles No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 330 ÷ 15 = 22 B tiles per long row 40 ÷ 15 = 3 long rows (1 row of tiles will be cut) 22 × 3 = 66 A tiles 90 ÷ 15 = 6 tiles per short row 30 ÷ 15 = 2 short rows 6 × 2 = 12 tiles 66 + 12 = 78 tiles No of boxes needed = 7 (12 × 7 = 84 tiles) £11.49 × 7 = £80.43			boxes needed ('15900' ÷ '225') ÷ 12 rounded up to nearest whole number) **B1** for answers or £79.92 and £80.43 to justify the choice **C1** for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable** **OR** **M1** for 330 ÷ 10 or 90 ÷ 10 or 330 ÷ 15 or 90 ÷ 15 **A1** for (33 and 9) or (22 and 6) **M1** for 33 × 4 + 9 × 3 or 22 × 3 + 6 × 2 **A1** ft for 10 A boxes needed ('33 × 4' ÷ '9 × 3') ÷ 20 rounded up to nearest whole number) or for 7A boxes needed ('22 × 3' ÷ '6 × 2') ÷ 12 rounded up to nearest whole number) **B1** for answers or £79.92 and £80.43 to justify the choice **C1** for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable**
	(b)	The carton can have dimensions 42 cm × 31.5 cm × 21 cm or 63 cm × 21 cm × 21 cm or 84 cm × 31.5 cm × 10.5 cm or 63 cm × 42 cm × 10.5 cm or 126 cm × 21 cm × 10.5 cm	Net	3	**B1** for quoting a correct set of dimensions (could be simply on the diagram) **M1** for a net showing 6 rectangles that could form a cuboid **A1** for an accurate scale drawing or lengths labeled accurately
					Total for Question: 9 marks

M26.

Working	Answer	Mark	Additional Guidance
50 + 60 =	110	2	**M1** for 50 + 60 or for 180 – k, where k = 180 – "(60+50)"

			A1 for 110 cao
			Total for Question: 2 marks

M27.

Answer	Mark	Additional Guidance
Correct construction	2	**M1** for constructing intersecting arcs of equal radius. **A1** for a correct triangle, with appropriate arcs. SC: **B1** for a triangle drawn within guidelines if M0 scored. NB: Guidelines allow for 2mm tolerance
		Total for Question: 2 marks

M28.

	Working	Answer	Mark	Additional Guidance
(a)		129 – 133	1	**B1** for 129 – 133
(b)	6 × 50	290 – 310	2	**B2** for 290 – 310 (**B1** for 6 ± 0.2 (cm) seen or for d × 50 with $3 \leq d \leq 9$)
(c)		Point C marked	2	**B1** for *BC* = 7 ± 0.2 cm **B1** for bearing = 60 ± 2°
				Total for Question: 5 marks

M29.

Working	Answer	Mark	Additional Guidance
$x + 30 + 2x + 3x = 180$ $6x + 30 = 180$ $6x = 150$	25	3	**M1** for $x + 30 + 2x + 3x$ or $6x+30$ seen or 180 – 30 or 150 seen **M1** (dep) for 6 × +30 = 180 or better or $\frac{"180-30"}{6}$ **A1** cao
			Total for Question: 3 marks

M30.

Answer	Mark	Additional Guidance
	2	**M1** for correct intersecting arcs **A1** for correct angle bisector SC: if no marks, **B1** for line within guidelines

	Total for Question: 2 marks

M31.

	Answer	Mark	Additional Guidance
(a)		2	**B2** correct reflection (**B1** correct reflection in the line $x = k$, $k \neq 0$)
(b)	Rotation 90° about the centre (0,0)	3	**B1** for rotation **B1** for 90° (anticlockwise) or 270 clockwise or ¼ turn (anticlockwise) or ¾ turn clockwise **B1** for (0,0) or *O* or origin NB: a combination of transformations gets B0
			Total for Question: 5 marks

M32

	Answer	Mark	Additional Guidance
(a)	Vertices at (2, –2), (7, –2), (7, –6), (4, –6), (4, –4), (2, –4)	2	**B2** for a fully correct rotation [**B1** for correct shape with correct orientation **OR** a 90° anticlockwise rotation about *O* **OR** a 180° rotation about *O* **OR** for any 3 correct sides in the correct position]
(b)	Translation by $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$	2	**B1** for translation **B1** (indep) for $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ or 3 right and 1 down
			Total for Question: 4 marks

M33.

Answer	Mark	Additional Guidance
Diagram	4	**M1** arc radius 4 cm centre *B* within the guidelines **M1** angle bisector from *A* to *BC* within the guidelines **A1** for clear indication that inside of arc is being identified as correct region for the first condition, or that side of straight line nearer to *C* is identified as correct region for the second condition. (Note that only 1 of the Ms need be awarded for this A mark to be awarded) **A1** fully correct region Ignore any drawing outside the given triangle
		Total for Question: 4 marks

M34.

Working	Answer	Mark	Additional Guidance
360 ÷ 10 = 36 180 – 36 180 × (10 − 2) ÷ 10	144	3	**M1** for 360 ÷ 10 or 36 seen **M1** (dep) for 180 – "36" **A1** cao **OR** **M1** for 180 × (10 − 2) oe or 1440 seen **M1** (dep) for "1440" ÷ 10 **A1** cao
			Total for Question: 3 marks

M35.

Working	Answer	Mark	Additional Guidance
$\frac{40000}{125} = \frac{8000}{25}$ = 320 seconds	320	3	**M1** for 40 × 1000 or 125 ÷ 1000 or 40000 or 0.125 **M1** for $\frac{'40000'}{125}$ or $\frac{40}{'0.125'}$ **A1** cao **OR** **M1** for 1000 ÷ 125 **M1** for '8' × 40 **A1** cao
			Total for Question: 3 marks

M36.

	Answer	Mark	Additional Guidance
(a)		2	**M1** rectangle with either correct width or height or any square **A1** cao
(b)		2	**B2** for a correct sketch (**B1** any 3-D sketch of no more than 4 faces seen, with a trapezoidal face)
			Total for Question: 4 marks

M37.

	Working	Answer	Mark	Additional Guidance
(a)		opp sides are equal	1	**B1** for a correct explanation
(b)	$4x - 2x = 12 - 1$	5.5	2	**M1** for $4x + 1 - 1 - 2x = 2x + 12 - 1 - 2x$ oe **A1** for 5.5 or 11/2 or 5½
(c)	'5.5' × 2 +	57	2	**M1** for correct substitution of x = '5.5' into the

	4 × ’5.5’ + 1 + 2’5.5’ + 12			four expressions to find the sum of FOUR sides or 8*x* + 13 seen **A1** ft
				Total for Question: 5 marks

M38.

	Working	Answer	Mark	Additional Guidance
FE	Area of the room = 4 × 8 + 4 × 6 = 56 Area of a tile = 0.5 × 0.5 = 0.25 Number of tiles = 56 ÷ 0.25 = 224 Cost = 4 × 224 **OR** No of tiles around room = 2 × lengths of room = 8, 16, 16, 12 Total number of tiles = 8 × 16 + 8 × 12 = 224 Cost = 4 × 224	£ 896	6	**M1** for full method for finding the area of the room **A1** at least one area correct **B1** for area of tile = 0.25m^2 or 2500 cm^2 or 4 tiles = 1m^2 **M1** for area of room ÷ area of a tile **M1** for 4 × number of tiles **A1** cao **OR** **M1** for doubling each length to show number of tiles for each side **B1** for 8, 16, 16 and 12 **M1** for a full method of finding the number of tiles (12 × 16 + 8 × 4) **A1** for at least one ‘section’ correct **M1** for 4 × ‘224’ **A1** cao
				Total for Question: 6 marks