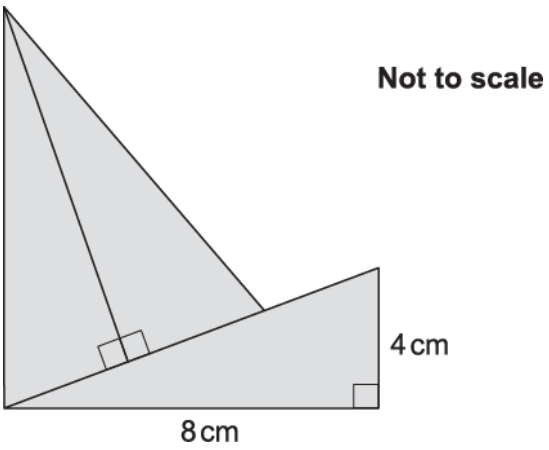
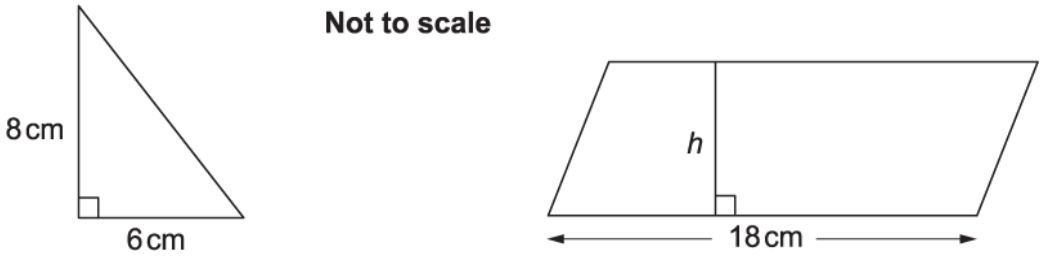
1. This shape is made from three congruent right-angled triangles.




Find the total area of the shape.

_____ $cm^2$ **[3]**

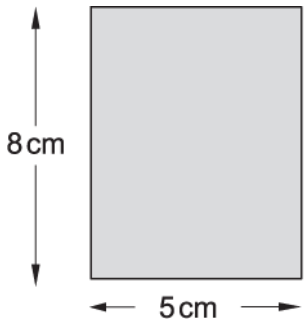
2. The area of the parallelogram is **three** times the area of the triangle.




Show that the perpendicular height *h* of the parallelogram is 4 cm.

**[4]**

3(a). Jo makes a pendant from a rectangular piece of silver.

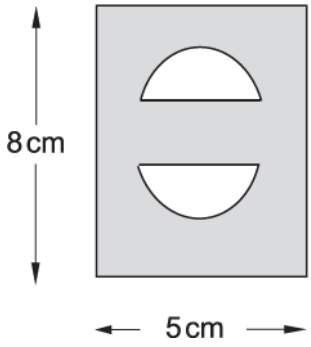



**Not to scale**

Work out the area of this rectangle.

_____ $cm^2$ **[1]**

(b). To complete the pendant, Jo cuts two semicircles of radius 1 cm from the rectangle, as shown below.




**Not to scale**

Show that the shaded area is 36.9 $cm^2$ correct to three significant figures.

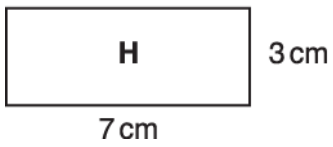
**[4]**

(c). The silver Jo uses is 2 mm thick.

Find the volume of silver in the pendant.
Give your answer in $cm^3$.

_____ $cm^3$ **[3]**

4. Rectangle **H** has length 7 cm and width 3 cm.



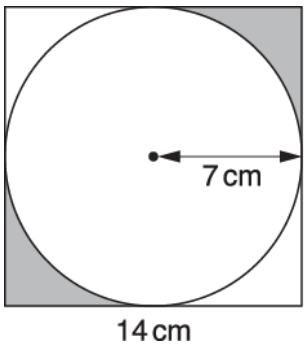

**Not to scale**

Work out the area of the rectangle.

_____ $cm^2$

**[1]**

5. This diagram shows a circle inside a square.




**Not to scale**

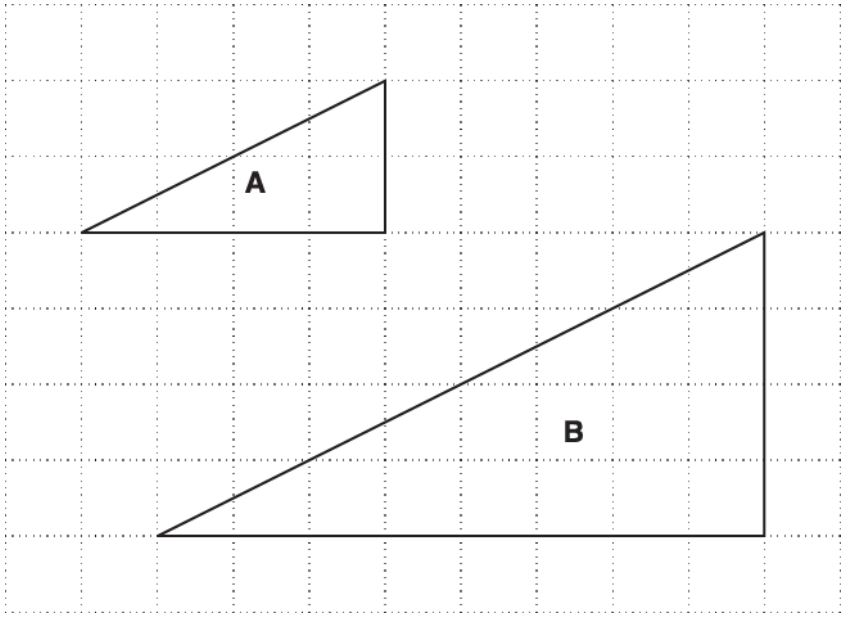
The radius of the circle is 7 cm.
The length of a side of the square is 14 cm.

Calculate the shaded area.

_____ $cm^2$

**[4]**

6. Triangle **A** and triangle **B** have been drawn on the one-centimetre grid.




(i) Find the area of triangle **A**.

**(i)** _____ $cm^2$

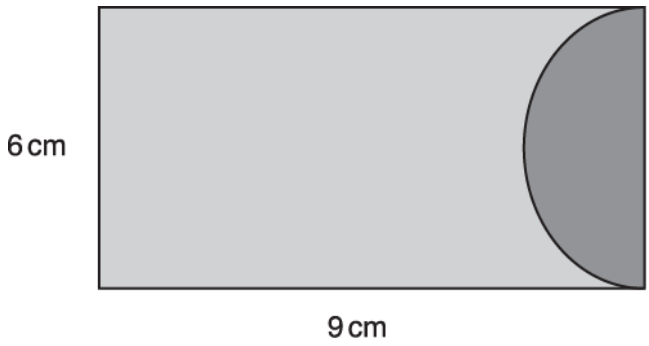
**[1]**

(ii) Measure the perimeter of triangle **A**.

**(ii)** _____ cm

**[1]**

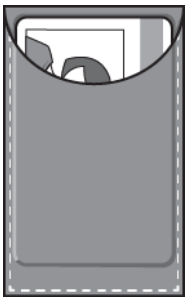
7. * The case shown below is used to store a travel card.




**Not to scale**

The case is two rectangles of leather joined together.

One of the rectangles has a semicircle cut away.

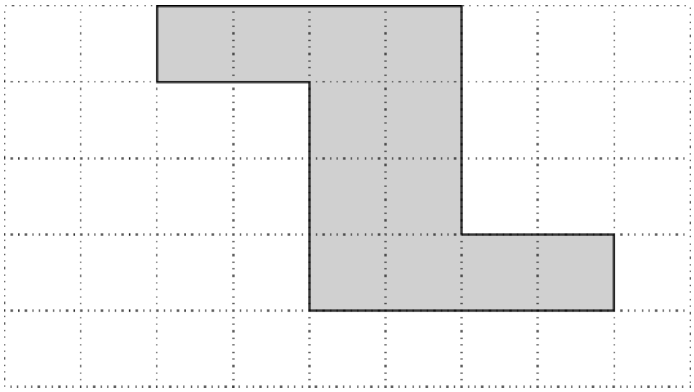


Work out the total area of leather in the case.

_____

**[6]**

8. This shape is drawn on a one-centimetre square grid.

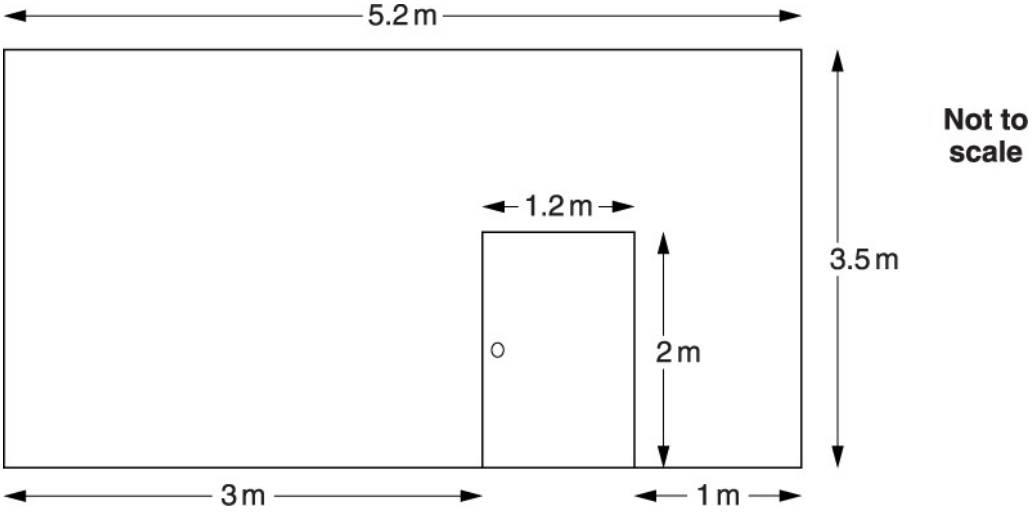


Find the area and the perimeter of the shape.

Area = _____ $cm^2$

Perimeter = _____ cm **[2]**

9. One wall of a house is shown below.



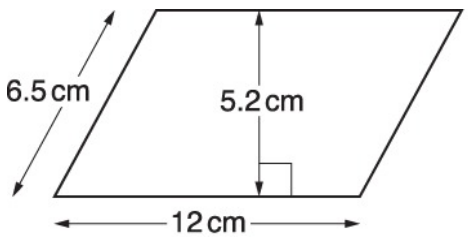

The rectangular wall is 5.2 m long and 3.5 m high.
The wall has a rectangular door of height 2 m and width 1.2 m.
The wall is painted at a cost of £12.50 per square metre.
The door is **not** painted.

Calculate the cost of painting the wall.

£ _____ **[5]**

10(a) Here is a parallelogram.

.




**Not to scale**

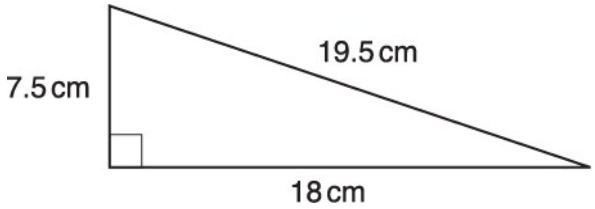
(i) Calculate the area of the parallelogram.

**(i)** _____ $cm^2$ **[2]**

(ii) Work out the perimeter of the parallelogram.

**(ii)** _____ cm **[1]**

(b).




**Not to scale**

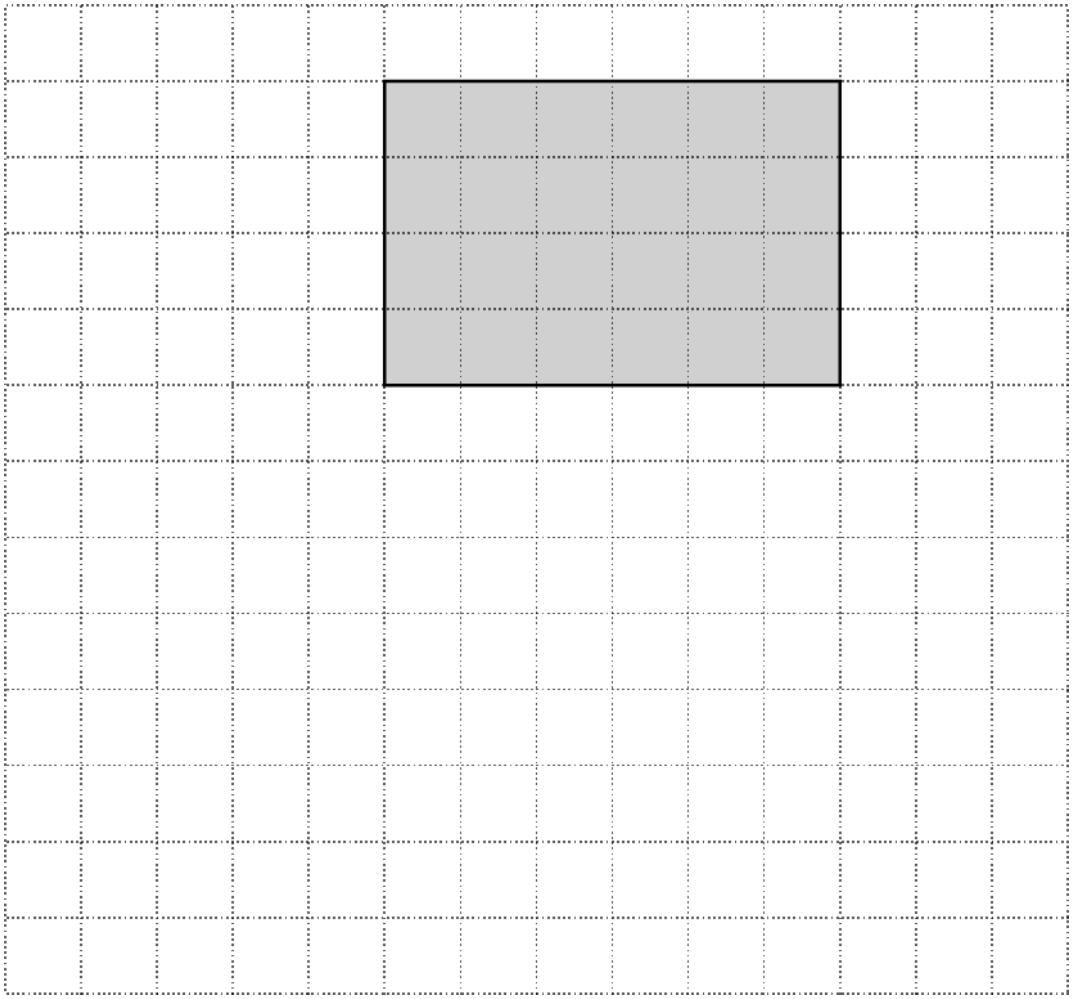
(i) Calculate the area of this triangle.

**(i)** _____ $cm^2$ **[2]**

(ii) Write your answer to part **(i)** in $mm^2$.

**(ii)** _____ $mm^2$ **[1]**

11. A rectangle has been drawn on a one-centimetre square grid.



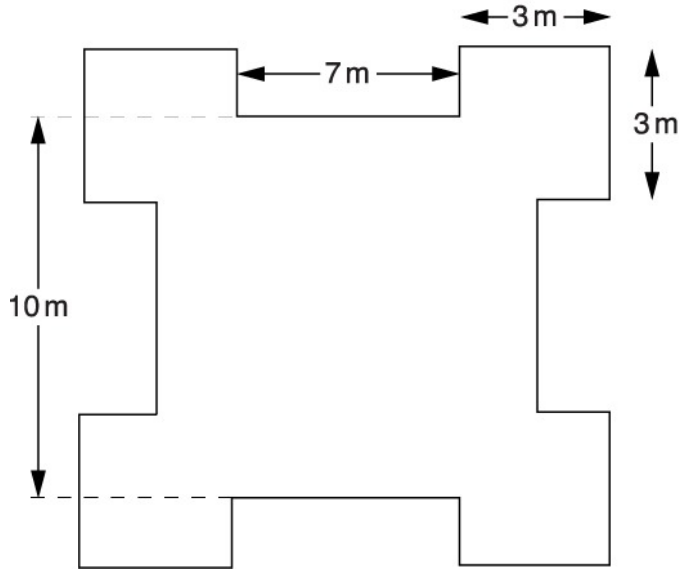
Rupert wants to draw a rectangle with an area of 30 $cm^2$.
The lengths of all the sides will be whole numbers.

Find the difference between the smallest and largest perimeters of the rectangles he could draw.

Show all your working.

_____ cm **[4]**

12. The diagram shows the plan of a castle.
The plan has four lines of symmetry.

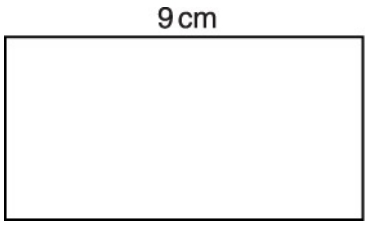



**Not to scale**

Work out the area of the plan.

_____ $m^2$ **[4]**

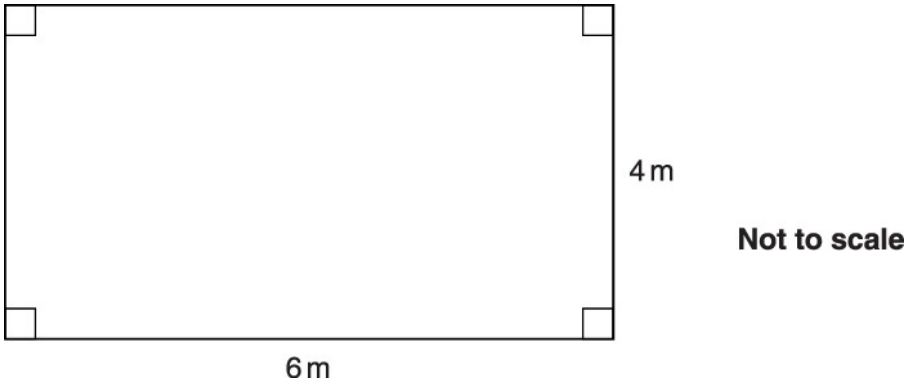
13. Calculate the area of this rectangle.
Give the units of your answer.




**Not to scale**

_____ [2]

14. Here is a plan of Bill's living room.




Bill is fitting wooden flooring and edging strip in his living room.

The prices are shown in the table.

| Item | Cost |
|---|---|
| Wooden flooring | £21.75 for each square metre |
| Edging strip | £4.50 for each metre length |

Bill buys wooden flooring to cover the total **floor area** of his room and edging strip to fit around the **perimeter** of the room.

Calculate the total cost of the flooring and edging strip for Bill's living room.

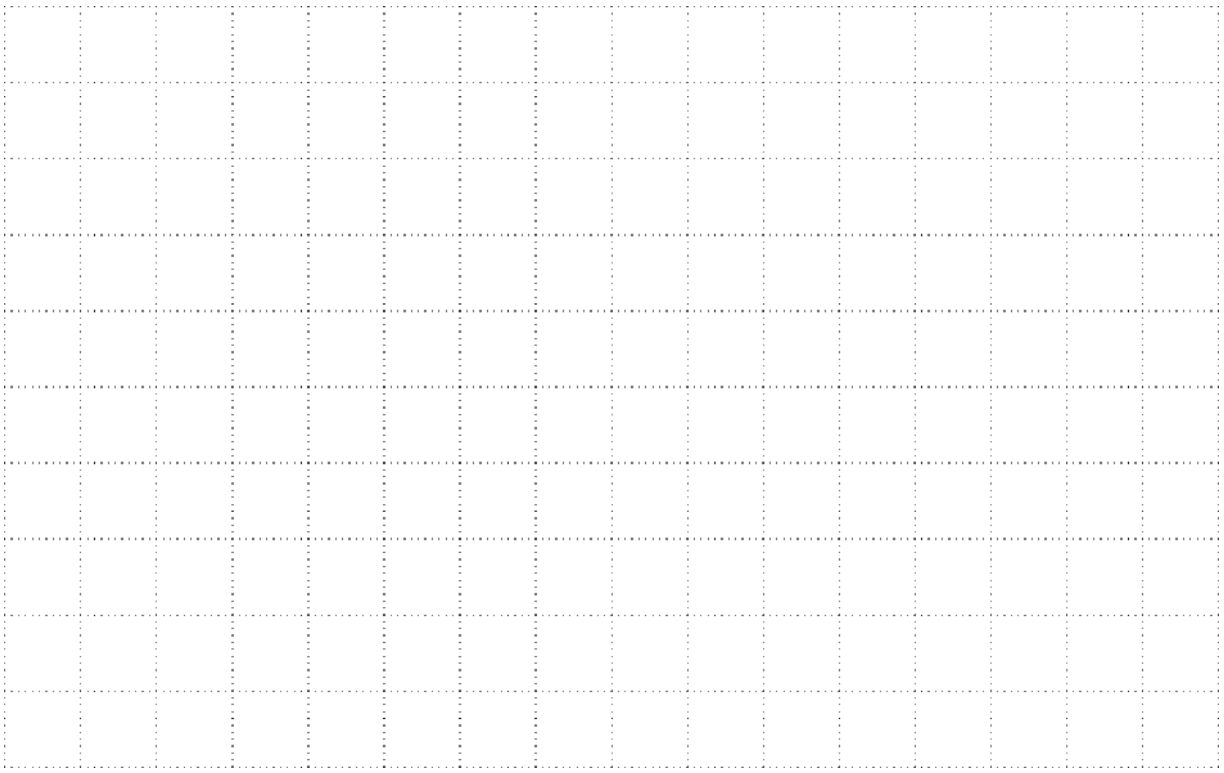
£ _____ [5]

15. * Clare draws some rectangles.

Each rectangle has an area of 18 $cm^2$.

The sides, when measured in centimetres, are whole numbers.

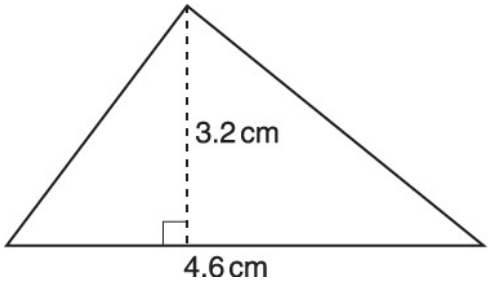
What are all the possible perimeters of her rectangles?



[5]

16(a) Work out the area of this triangle.

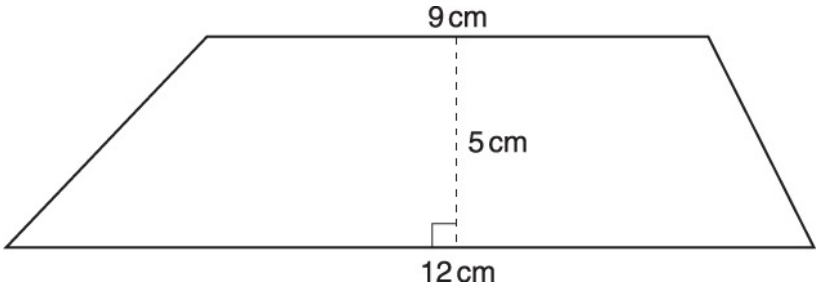
.




**Not to scale**

_____ $cm^2$ **[2]**

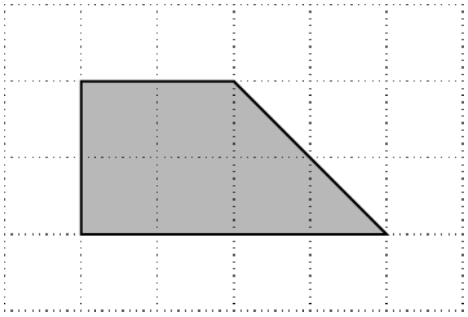
(b). Work out the area of this trapezium.




**Not to scale**

_____ $cm^2$ **[2]**

17. This quadrilateral is drawn on a centimetre square grid.



(i) What is the mathematical name of the quadrilateral?
Choose from the words in the box.

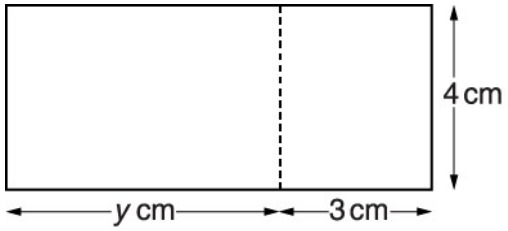
| kite | trapezium | parallelogram | rhombus |
|---|---|---|---|

(i) _____ [1]

(ii) Work out the area of the quadrilateral.

(ii) _____ $cm^2$ [1]

18. The total area of this rectangle is 42 $cm^2$.




**Not to scale**

Work out length *y*.

_____ [3]

19. At a zoo the Lemurs have a rectangular enclosure 11 metres long and 7 metres wide.

Work out

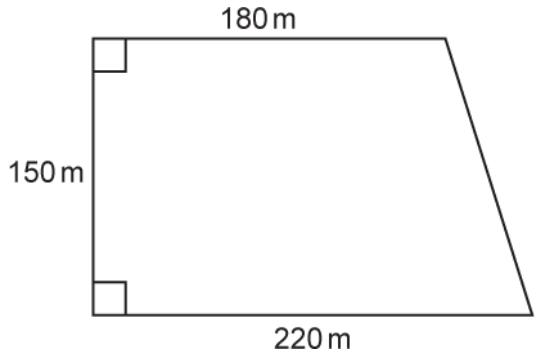
(i) the perimeter of the enclosure,

(i) _____ m [2]

(ii) the area of the enclosure.
Give the units of your answer.

(ii) _____ [3]

20. A farmer has a field that is in the shape of a trapezium.
He measures the field so that he can work out the area.
He puts his measurements on this diagram of the field.



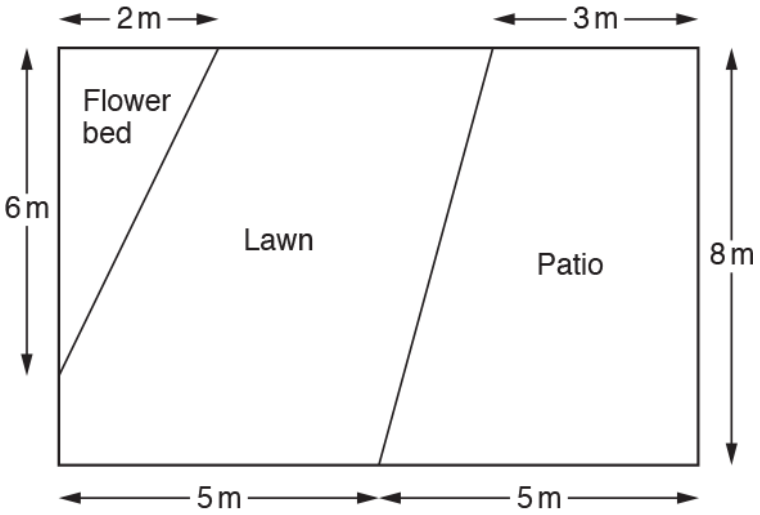

**Not to scale**

The field produces 6400 kilograms of wheat per hectare.
One hectare is 10 000 $m^2$.

Work out how many kilograms of wheat the field produces.

_____ kg **[5]**

21. The diagram represents a rectangular garden of length 10 m and width 8 m.
The flower bed is a triangle and the patio is a trapezium.
The rest of the garden is lawn.




Not to scale

Work out the area of the lawn.

---------- $m^2$ **[6]**

END OF QUESTION PAPER

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 1 | | | 48 ($cm^2$) | 3 | **M1** $\frac{1}{2} \times 8 \times 4 = 16$<br>**M1** *their* '16' × 3 | |
| | | | **Total** | **3** | | |
| 2 | | | Correct working leading to 4 cm | 4 | **B1** for area of triangle is 24<br>**B1** for *their* '24' × 3<br>**B1** for *their* '72' ÷ 18 or area of parallelogram = 18*h* | |
| | | | **Total** | **4** | | |
| 3 | a | | 40 | 1 | | |
| | b | | Correct reasoning leading to 36.9 | 4 | **M2** for $\pi \times 1^2$<br>Or<br>**M1** for $\frac{1}{2} \pi \times 1^2$<br>And **M1** for *their* '40' $-\pi \times 1^2$ | |
| | c | | 7.38 or better | 3 | **M1** for 2 mm = 0.2 cm **soi**<br>**M1** for 36.9 × *their* '0.2' **oe** | |
| | | | **Total** | **8** | | |
| 4 | | | 21 | 1 | | Examiner's Comments<br><br>Many correct answers in this question. There are still candidates confusing area and perimeter with an error of 20 most common. |
| | | | **Total** | **1** | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 5 | | | 21.02 to 21.03[…] | 4 | **M3** for $\frac{14^2 - 49\pi}{2}$ soi by 21 to 21.07<br><br>Or<br><br>**M2** for $14^2 - 7^2 \times \pi$ soi by 42 to 42.14..<br><br>Or<br><br>**M1** for $7^2 - \pi$<br><br>**SC0** for 21 as answer without working | Allow value of 49π as 153.86 to 154 49 can be $7^2$<br><br>**Examiner's Comments**<br><br>Better students at this level coped quite well with the organisational skills required but many others struggle to present their work logically. A significant number were unsure of the formulae for a circle, giving equations for both the area and the circumference and sometimes even using both to try to calculate the required area. Some then multiplied 14 by 4 to find the area of the square! Some, having correctly found the areas of the square and the circle and subtracted them, didn't then halve their answer to find the required answer. Full marks were scored by strong candidates but premature, or incorrect, rounding often lost the final accuracy mark. |
| | | | **Total** | **4** | | |
| 6 | | i | 4 | 1 | | |
| | | ii | 10.2 to 10.7 | 1 | | <u>Examiner's Comments</u><br><br>Almost all candidates gave the correct area but many struggled with the perimeter. Most overlooked the instruction 'measure' given in the question and gave an answer of 10 obtained by counting squares and including the diagonal line as 4 cm. |
| | | | **Total** | **2** | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 7 | | | | | | Examiner's Comments<br><br>The quality of presentation was varied. Many candidates failed to explain what they were finding and did not fully document parts of their working. Some arrived at the correct answer and many realised they needed to include units with their answer. A common error was to subtract the area of a full circle rather than a semicircle though some used the formula for circumference. The least able candidates just gave the area of the rectangle and did not know how to proceed. |
| | | | | | Eg. Rectangle oe = 9 × 6<br>[Semi-]circle oe = ½ × π × $3^2$ oe<br>[Total area] = 2 × (9 × 6) – ½ × π × $3^2$ oe<br>= 93.86 to 94 $cm^2$ | |
| | | | 93.86 to 94 with commentary | 5-4 | 93.86 to 94 with no/poor commentary | |
| | | | 2 × (9 × 6) – ½ × π × $3^2$ oe | 3-2 | ½ × π × $3^2$ oe **OR** 9 × 6 and π × $3^2$ oe | |
| | | | 9 × 6 or π × $3^2$ oe | 1-0 | No worthy work. | |
| | | | | AND | | |
| | | | $cm^2$ with *their* final answer | 1 | | |
| | | | Total | 6 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 8 | | | Area = 12<br>and<br>Perimeter = 20 | 2 | **B1** for each correct<br><br>**Examiner's Comments**<br><br>Most coped with the area by counting squares but there were some errors in finding the perimeter. | |
| | | | **Total** | **2** | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 9 | | | 197.5[0] | 5 | **M4** for 227.5 – 30 oe<br><br>OR<br>**B3** for area = 15.8 isw rounding<br>Or **M2** for any complete method shown to find the area of the wall<br>Or **M1** for correct method for area of one relevant rectangle<br>AND<br>**M1indep** for *their* area × 12.5<br><br>**Examiner's Comments**<br><br>Many candidates scored all 5 marks with clear presentation of their method. The most successful method was to find the area of the wall before subtracting the area of the door and then multiplying by 12.50. Some accurately worked out the area of the wall to be painted but then thought that they had to have a whole number and so rounded 15.8 to 16 before multiplying. Others attempted longer area methods and often omitted an area or included one twice. Quite a number mistakenly were looking at perimeters or lengths of edges and only scored a mark for multiplying 'their area' by 12.5. Others attempted to multiply but used non calculator methods and made arithmetic errors. | Ignore units throughout for **M** and **B** marks<br><br>eg soi by 18.2, 2.4, 1.8, 10.5, 3.3, 7.8, 6, 6.3<br><br>Allow for 'a number' × 12.5<br>Can be clearly implied |
| | | | Total | 5 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 10 | a | i | 62.4 | 2 | **M1** for 12 × 5.2 | 12 × 5.2 + 5.2 score M0 |
| | | ii | 37 | 1 | **Examiner's Comments**<br><br>In part (i), by far the most common solution was 78 from the product of 6.5 and 12 instead of using the perpendicular height of 5.2 for the calculation. Part (ii) was usually correct but a number of candidates found the area instead of the perimeter. | |
| | b | i | 67.5 | 2 | **M1** for ½ × 18 × 7.5 oe | |
| | | ii | 6750 | 1FT | **FT** *their* (b)(i) × 100<br><br>**Examiner's Comments**<br><br>In part (i), many correctly found the area of the triangle; some forgot to halve the correct product and few thought that all three lengths of the triangle needed to be used in the calculation. Part (ii) was only occasionally answered correctly. Converting between units of area is an area to improve. Multiplying was the most common error. | |
| | | | Total | 6 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 11 | | | 40 | 4 | **B3** for 3 of 62, 34, 26, 22, nfww or 62 and 22 clearly identified as largest/smallest<br>or<br>**B2** for 2 of 62, 34, 26, 22, nfww<br>or<br>**M2** for 3 different rectangles of area $30cm^2$ drawn<br>or<br>**B1** for 1 of 62, 34, 26, 22, nfww<br>or<br>**M1** for 2 different rectangles of area $30cm^2$ drawn<br>or<br>if 0 scored **SC1** for 2 correct factor pairs of 30, perimeters need not be stated.<br><br>**Examiner's Comments**<br><br>This question was answered well by only a minority of candidates with many confusing area and perimeter throughout the question. There was the potential of 4 rectangles to be considered but it was very rare to see the dimensions of the fourth of 1 × 30. The third (2 ×15) was also not that common and as a result full marks were not often recorded. Some work was well thought out and well presented in a logical manner, but other offerings were poorly presented and examiners had to search to find evidence of correct calculations. | |
| | | | Total | 4 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 12 | | | 127 | 4 | accept any correct method<br><br>Examiner's Comments<br><br>The correct answer was rarely seen. Some candidates did not spot the symmetries even though they were directed to this information. The most frequent mark given was for 13 × 13, 13 × 10 or 7 × 7. The decimal/fractional lengths of 1.5 were very badly dealt with and few candidates gained marks for any multiplication involving 1.5 and frequently 1.5 × 1.5 became 3. There were some very large answers from multiplying all the figures they could find. The solutions were often extremely difficult to follow as work was not attempted using a logical approach. Many candidates tried to find the perimeter rather than area. However many candidates should be pleased they got some marks for this question which had no scaffolding. There is confusion about perimeter and area, especially when candidates started to partition off the shape. The most successful candidates annotated the diagram dividing it into areas which they then attempted to calculate. | See additional guidance<br>Mark the method which leads to the final answer |
| | | | Total | 4 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 13 | | | 31.5<br>$cm^2$ | 1<br>1 | Examiner's Comments<br><br>Many candidates had the correct area of 31.5, but failed to give the units. A common error was giving 25, this being the perimeter. | |
| | | | Total | 2 | | |
| 14 | | | 612 | 5 | **M4** for 4 × 6 × 21.75 + (4 + 6 + 4 + 6) × 4.5[0]<br>or **M3** for 4 × 6 × 21.75 [= 522] soi<br>**and** (4 + 6 + 4 + 6) × 4.5[0] [= 90] soi<br>or **M2** for 4 × 6 × 21.75 [=522] soi<br>**or** (4 + 6 + 4 + 6) × 4.5[0] [= 90] soi<br>or **M1** for 4 × 6 or 4 + 6 + 4 + 6 shown<br><br>Examiner's Comments<br><br>This question, involving area and perimeter within a context, was quite well answered and the correct solution was often seen. Some candidates confused area and perimeter. Others considered only two sides of the room for the edging. There were many solutions with either £522 or £90, the correct cost for the flooring or edging, as candidates used either the area or the perimeter for each of the parts. | |
| | | | Total | 5 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 15 | | | * All 3 correct perimeters given (with no extras) **with** a full method (showing calculations) and including units | 5 | | |
| | | | 3 correct different perimeters (ignore units or extras)<br>**without** a full method or **no** method<br>**or** gives 2 correct different perimeters (ignore units or extras) with some method (showing correct rectangles sufficient for method) | 4 – 3 | 2 correct different perimeters (ignore units or extras) with **no** method<br>**or** gives 1 correct perimeter (ignore units or extras) with some method<br>(showing correct rectangle sufficient for method here) | |
| | | | 1 correct perimeter (ignore units or extras) with **no** method<br>Do not accept Perimeter = 18 $cm^2$ on its own with no method<br>**or** shows at least 2 factor pairs of 18<br>**or** at least 2 different rectangles (with integer sides) with area 18 $cm^2$ | 2 – 1 | shows 1 factor pair of 18<br>**or** any rectangle with area 18 $cm^2$<br>**or** shows the correct method for finding any perimeter of a rectangle, ignore units<br>**or** P= 2*a* + 2*b* **oe seen** | |
| | | | Shows no relevant working | 0 | Rectangles do not need to be scale drawings, they may be sketches with the length of the sides shown<br><br>**Correct perimeters**<br><br>18 cm by 1 cm – Perimeter = 38 cm<br><br>9 cm by 2 cm – Perimeter = 22 cm<br><br>6 cm by 3 cm – Perimeter = 18 cm<br><br>**Examiner's Comments**<br><br>Most candidates attempted this question and nearly | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| | | | | | always scored some marks.<br><br>Some candidates are confused as to the difference between area and perimeter and this caused difficulties for many. They need to have a clear understanding of which process leads to each definition and the appropriate units that are associated with each.<br><br>Marks were usually obtained for drawing one or two rectangles of area 18 $cm^2$.<br><br>Some went on to find perimeters, but their methods were not always easy to follow.<br><br>As always in QWC questions, candidates need to present their work clearly and coherently, using units where appropriate. | |
| | | | Total | 5 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 16 | a | | 7.36 | 2 | Mark final answer<br>**M1** for 0.5 × 4.6 × 3.2 **oe**<br><br>**Examiner's Comments**<br><br>Many candidates clearly did not know the formula for the area of a triangle, with some just multiplying the base by the height and a few adding them.<br>There were some correct answers with a full correct method shown. | |
| | b | | 52.5 | 2 | Mark final answer<br>**M1** for ½ × (9 + 12) × 5 **oe**<br><br>**Examiner's Comments**<br><br>Again, although the formula for the area of a trapezium is given in the formulae sheet, many did not use this and just combined the three given lengths in a variety of ways.<br><br>A small number gained a method mark for substituting the lengths into the formula correctly, but were unable to compute this to gain the second mark. | |
| | | | Total | 4 | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 17 | | i | trapezium | 1 | any clear indication | ignore spelling |
| | | ii | 6 | 1 | **Examiner's Comments**<br><br>Some candidates were not proficient in naming special types of quadrilateral and gave answers of rhombus or parallelogram rather than trapezium in part (i). The attempts to find a formula to use when finding the area of the shape often led to incorrect answers in part (ii). Those candidates who simply counted the squares were usually successful. | |
| | | | **Total** | **2** | | |
| 18 | | | 7.5 **oe** | 3 | mark final answer<br>**M2** for $(42 – 3 \times 4) \div 4$ **soi**<br>or $42 \div 4 – 3$ seen<br>or $4(y + 3) = 42$ **soi** or $4y = 30$ **soi**<br>Or<br>**M1** for $42 – 3 \times 4$ or an area of 30 **soi**<br>or $42 \div 4$ or 10.5 **soi**<br><br>**Examiner's Comments**<br><br>A significant number are confused by the difference between perimeter and area and went on to get an answer of 14cm. Others went on to find the area of the left rectangle to be $30cm^2$, but could get no further. Only a few candidates had the computational and problem solving skills needed to find a correct solution. | 30 may be in diagram |
| | | | **Total** | **3** | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| 19 | | i | 36 | 2 | **M1** for 11 + 11 + 7 + 7 or better | Ignore extra units given |
| | | ii | 77 | 2 | **M1** for 11 × 7 | |
| | | ii | $m^2$ | 1 | **Examiner's Comments**<br><br>Several candidates confused area and perimeter, In (i) many did give the correct answer of 36 but a surprising number wrote 11 + 11 + 7 + 7 and failed to add the numbers correctly, while others only added 2 sides. In (ii) many had either omitted the units or used m or $cm^2$. | |
| | | | **Total** | **5** | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | | |
|---|---|---|---|---|---|---|---|
| 20 | | | 19 000 or 19 200 | 5 | **M2** for 150 × (180 + 220) ÷ 2 **soi**<br>**Or**<br>**M1** attempt at an area<br><br>**And**<br>**M1** attempt to convert *their area* to hectares **soi**<br><br>**And**<br>**M1** for 6400 × *their area* | Mark answer line first, award 5 for a correct answer.<br>If incorrect, then award M marks for correct steps **seen**<br><br>Area of trapezium 30000<br><br>Such as 180 × 150 or 220 × 150<br><br>Eg *their* area ÷ 10000 oe<br><br>*Their area* in $m^2$ or hectares eg 180 × 150 × 6400 or 6400 × 30000 or eg 6400 × 3<br><br>For the final 2 marks their area may have come from an attempt at perimeter, volume, etc | |
| | | | Total | 5 | | | |

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | | |
|---|---|---|---|---|---|---|---|
| 21 | | | 42 | 6 | M1 $\frac{6\times 2}{2}$ oe for<br><br>A1 for [area triangle] = 6<br><br>M1 $\frac{3+5}{2}\times 8$ oe for<br><br>A1 for [area trapezium] = 32<br><br>M1 for 10 × 8 – (*their* area of triangle + *their* area of trapezium)<br><br>or for 2 × 2 + (*their* area of triangle + *their* area of trapezium) | Accept other equivalent methods<br><br>Could be implied by 24 + 8 | |

<u>Examiner's Comments</u>

Many candidates made a lot of dimensional errors in approaching this problem. Examples of this were multiplying the 3 sides of the patio together or working out perimeters or just adding given lengths together. Working out missing lengths was generally handled well but it was not being secure in area formulae that caused problems. A good number attempted the flower bed triangle area but answers of 12 were common due to not

| Question | | | Answer/Indicative content | Marks | Part marks and guidance | |
|---|---|---|---|---|---|---|
| | | | | | dividing by 2. Few were able to calculate the trapezium correctly with many giving the patio area as 5× 8=40. Those who gave an area of 6 for the triangle usually scored 3 marks as they realised the need to subtract their areas from 80. | |
| | | | Total | 6 | | |