1. Here is a net of a cube.

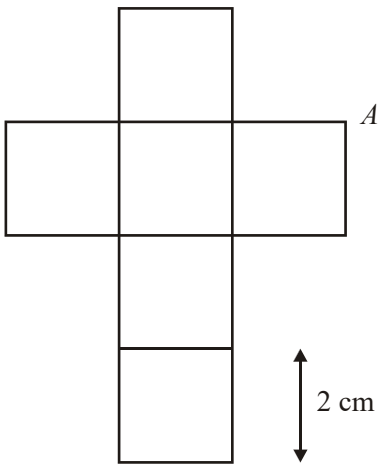


Diagram **NOT** accurately drawn

The net is folded to make the cube.
Two other vertices meet at *A*.

(a) Mark each of them with the letter *A*.

(2)

The length of each edge of the cube is 2 cm.

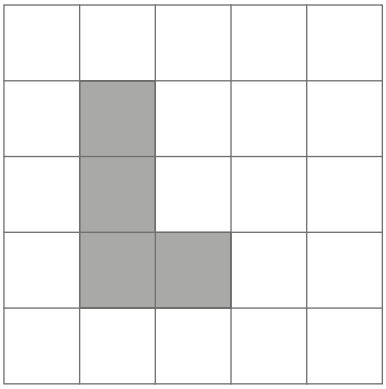
(b) Work out the volume of the cube.

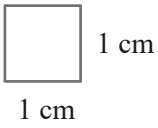
.....cm^3

(2)

(Total 4 marks)

2.





(a) (i) Find the area of the shaded shape.

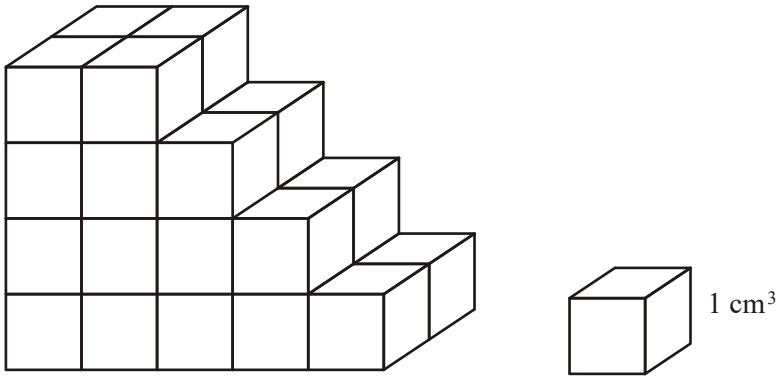
..... cm^2

(ii) Find the perimeter of the shaded shape.

..... cm

(2)

Here is a solid prism made from centimetre cubes.

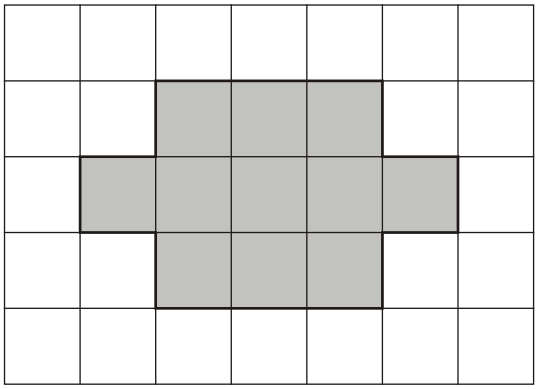


(b) Find the volume of the solid prism.

..... cm^3

(2)
(Total 4 marks)

3. A shaded shape has been drawn on the centimetre grid.



(a) (i) Find the area of the shaded shape.

……cm^2

(ii) Find the perimeter of the shaded shape.

…….cm

(2)

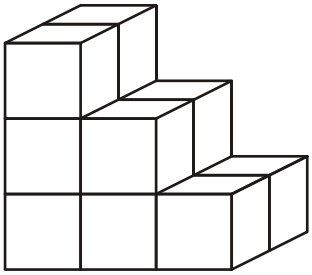
The shaded shape has **two** lines of symmetry.

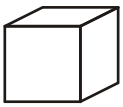
(b) Draw the **two** lines of symmetry on the shaded shape.

(2)

(c) Find the volume of this prism.

Diagram **NOT** accurately drawn





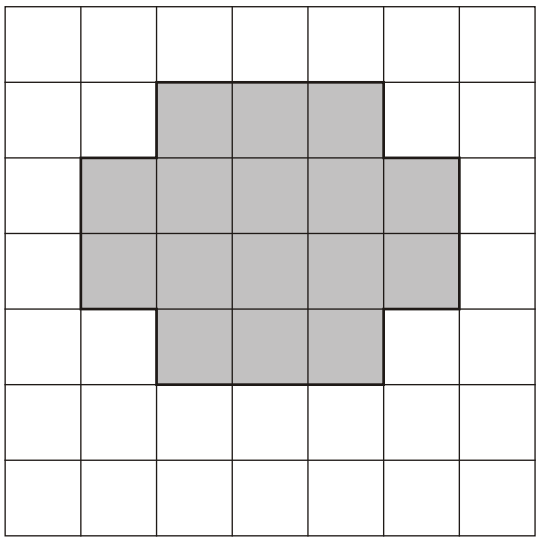
represents 1 cm^3

…….cm^3

(2)

(Total 6 marks)

4.



The diagram shows a shaded shape drawn on a centimetre grid.

(a) Find the area of the shaded shape.
State the units of your answer.

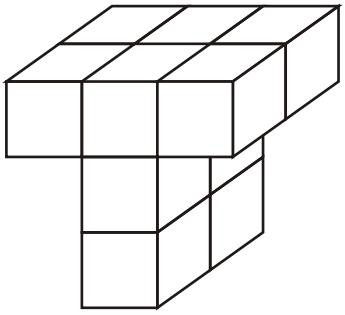
…….

(2)

(b) Find the perimeter of the shaded shape.

…….cm

(1)



The diagram shows a prism made of centimetre cubes.

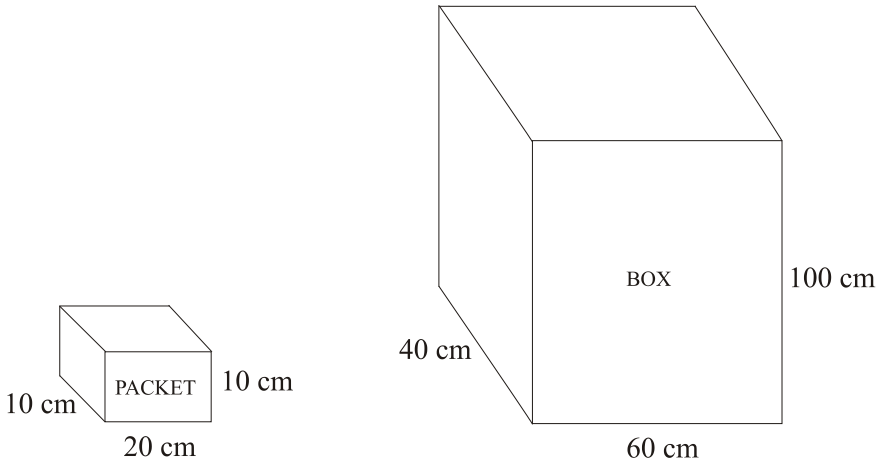
(c) Find the volume of the prism.

……cm^3

(2)

(Total 5 marks)

5.



Diagrams **NOT** accurately drawn

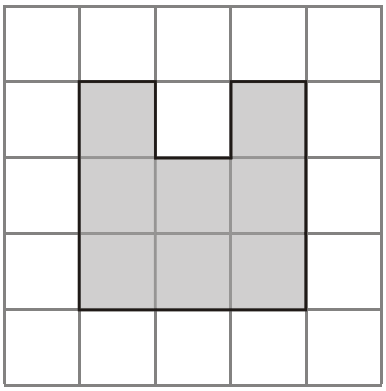
A packet measures 10 cm by 20 cm by 10 cm.
A box measures 40 cm by 60 cm by 100 cm.
The box is to be completely filled with packets.

Work out the number of packets which can completely fill the box.

.....

(Total 3 marks)

6. Here is a shaded shape on a centimetre grid.



(a) Find the area of the shaded shape.

..... cm^2

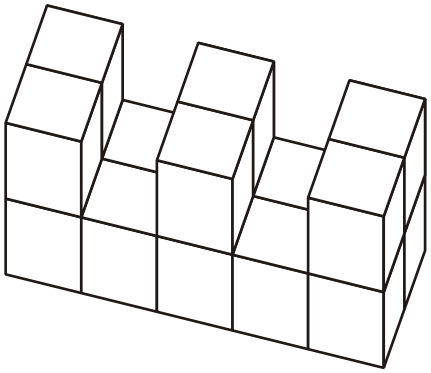
(1)

(b) Find the perimeter of the shaded shape.

..... cm

(2)

Here is a solid prism made of centimetre cubes.



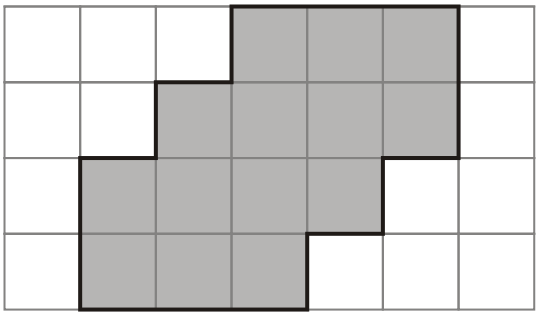
(c) Find the volume of the solid prism.

..... cm^3

(2)

(Total 5 marks)

7. This shaded shape is drawn on a grid of centimetre squares.



(a) Find the perimeter of the shaded shape.

..... cm

(1)

(b) Find the area of the shaded shape.

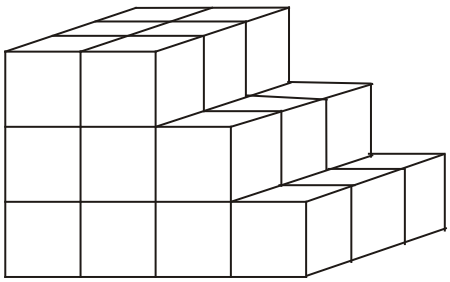
..... cm^2

(1)

This solid prism is made from centimetre cubes.

(c) Find the volume of the prism.

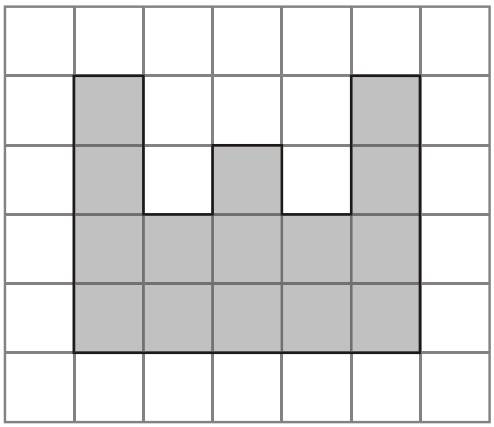
Diagram **NOT** accurately drawn



..... cm^3

(2)
(Total 4 marks)

8. A shaded shape has been drawn on the centimetre grid.



(a) Find the perimeter of the shaded shape.

..... cm

(1)

(b) Find the area of the shaded shape.

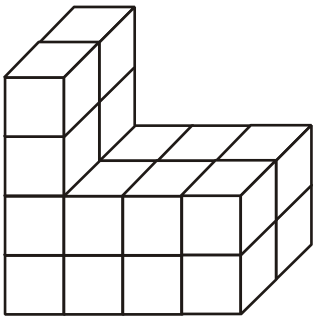
..... cm^2

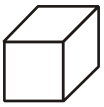
(1)

Here is a solid prism made from centimetre cubes.

(c) Find the volume of this prism.

Diagram **NOT** accurately drawn





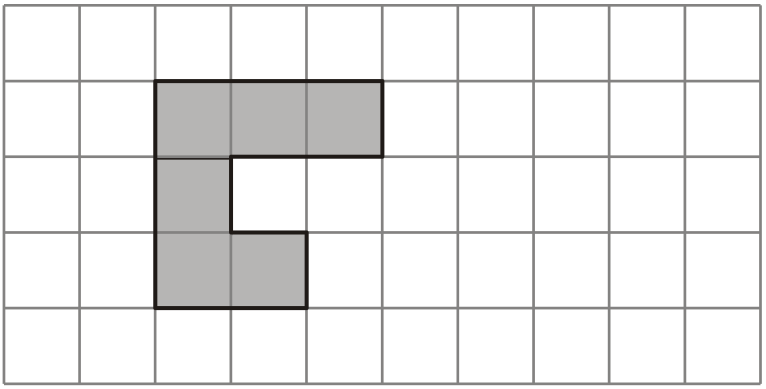
represents 1 cm^3

..... cm^3

(2)

(Total 4 marks)

9.



The shaded shape is drawn on a grid of centimetre squares.

(a) Find the perimeter of the shaded shape.

..... cm

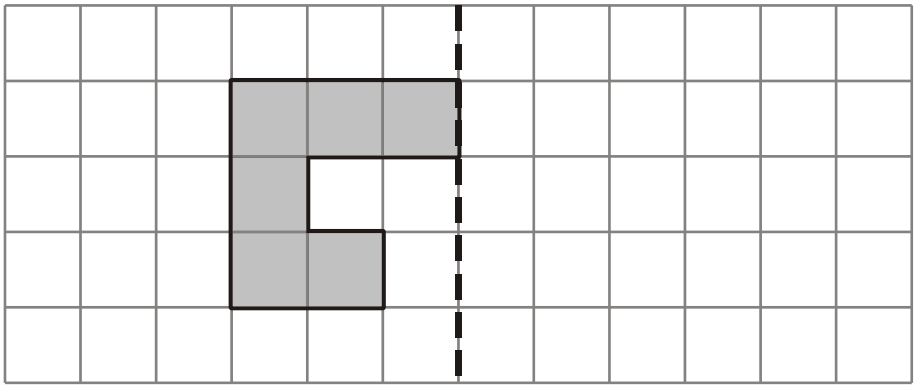
(1)

(b) Find the area of the shaded shape.

..... cm^2

(1)

Mirror Line



(c) Reflect the shaded shape in the mirror line.

(1)

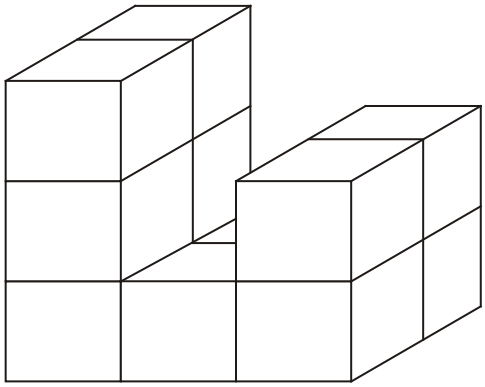


Diagram **NOT** accurately drawn

Here is a prism made of centimetre cubes.

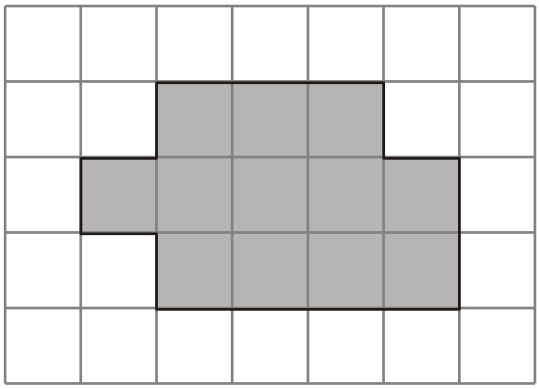
(d) Find the volume of the prism.

..... cm^3

(1)

(Total 4 marks)

10.



The diagram shows a shaded shape drawn on a centimetre grid.

(a) Work out the perimeter of the shaded shape.

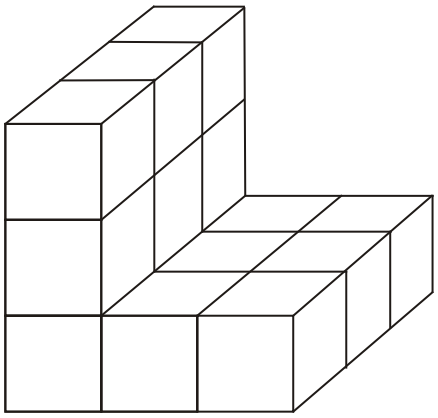
..... cm

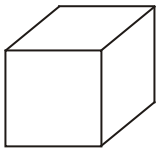
(1)

(b) Work out the area of the shaded shape.
State the units of your answer.

.....

(2)





represents
1 cm^3

Diagrams **NOT** accurately drawn

Here is a solid prism made of centimetre cubes.

(c) Find the volume of the solid prism.

..... cm^3

(2)
(Total 5 marks)

11. Here is a cuboid.

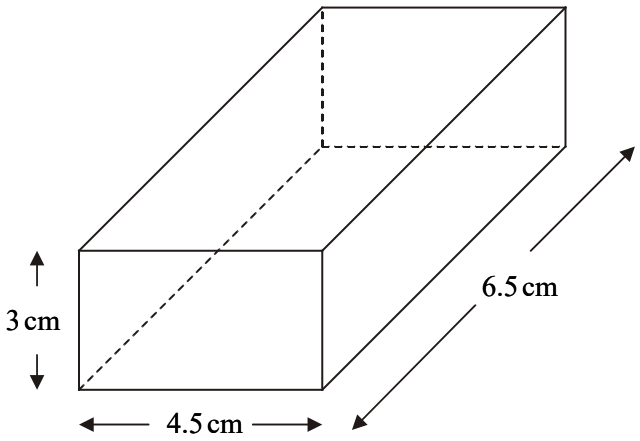


Diagram **NOT** accurately drawn

Calculate the volume of the cuboid.

..... cm^3

(Total 2 marks)

12.

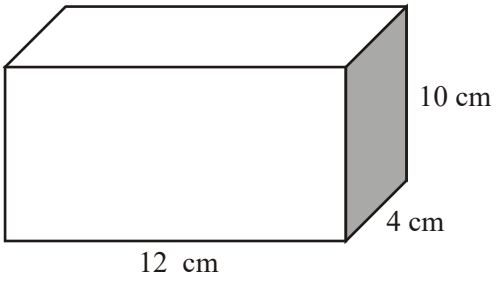


Diagram **NOT** accurately drawn

The diagram shows a box in the shape of a cuboid.

(a) Work out the volume of the box.

……. cm^3

(2)

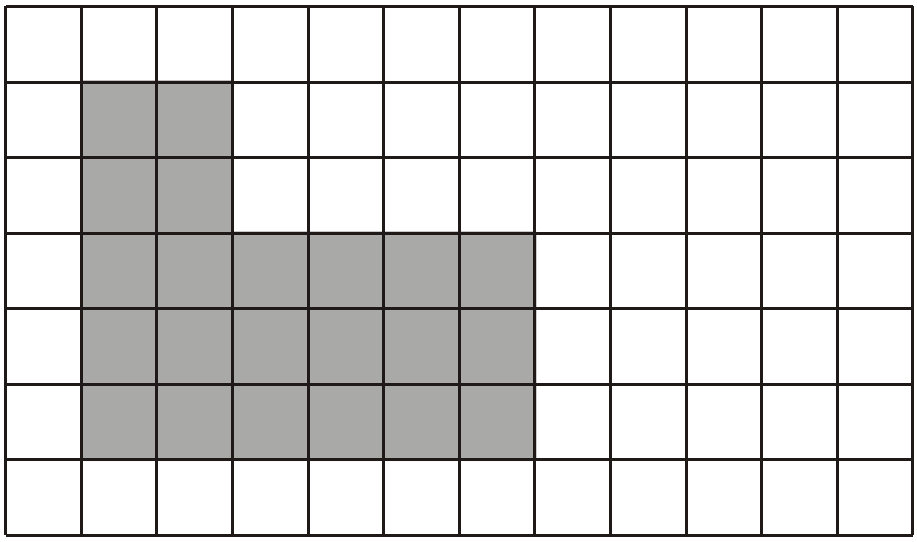
The box is full of sugar lumps.
Each sugar lump is in the shape of a cuboid.
Each lump is 1 cm by 1 cm by 2 cm.

(b) Work out the number of sugar lumps in the box.

……..

(1)
(Total 3 marks)

13.

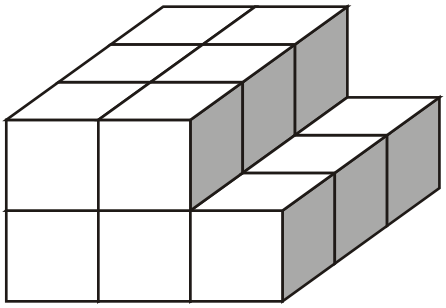


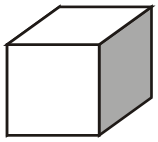
A shaded shape has been drawn on the centimetre grid.

(a) Work out the perimeter of the shaded shape.

……

(2)





Represents 1 cm^3

Diagram **NOT** accurately drawn

This solid shape is made from cubes of side one centimetre.

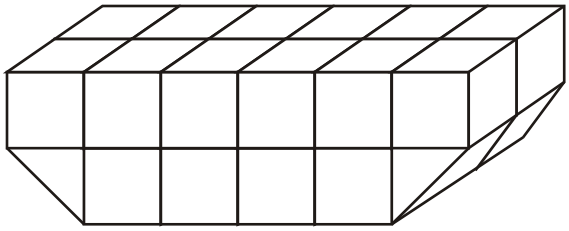
(b) Work out the volume of the solid shape.

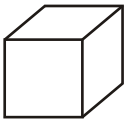
…… cm^3

(2)

(Total 4 marks)

14.





represents 1 cm^3

Diagrams **NOT** accurately drawn

In this solid prism, the volume of each small cube is 1 cm^3.

(i) Find the area of the top face of the prism.

..... cm^2

(ii) Work out the volume of the prism.

..... cm^3

(Total 3 marks)

15. Bob has 12 toy bricks.
Each toy brick is in the shape of a cube.
Each cube has sides of length 2 cm.

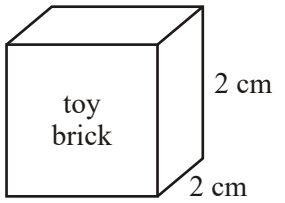


Diagram **NOT** accurately drawn

Bob builds a solid cuboid.
He uses all 12 toy bricks.

Write down the length, width and height of one cuboid that Bob can build.

length ..... cm

width ..... cm

height .....cm

(Total 2 marks)

16.

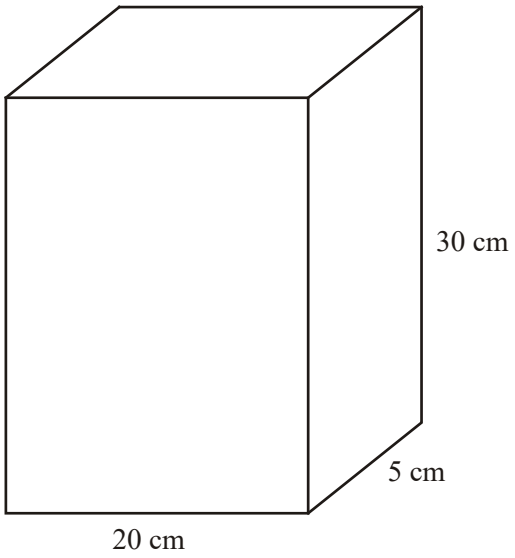


Diagram **NOT** accurately drawn

The diagram shows a cuboid.

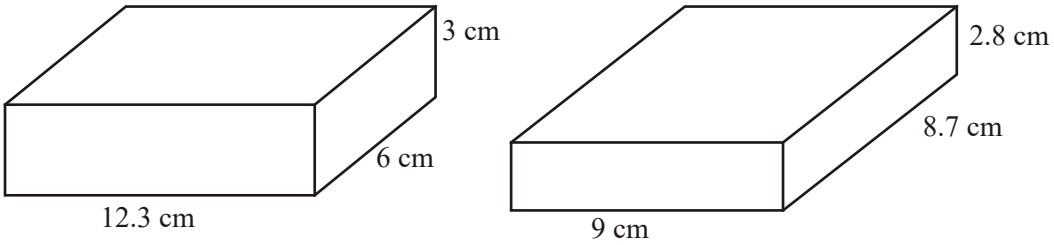
Work out the volume of the cuboid.

..... cm^3

(Total 2 marks)

17.

Diagram **NOT** accurately drawn



Box A **Box B**

Maxine has two boxes in the shape of cuboids.
Box A measures 12.3 cm by 6 cm by 3 cm.
Box B measures 9 cm by 8.7 cm by 2.8 cm.

Maxine wants to use the box with the greater volume.

Give the letter of the box Maxine should use.
You must show all your calculations.

.....

(Total 3 marks)

18. A cuboid has

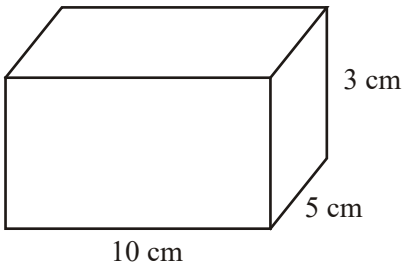


Diagram **NOT** accurately drawn

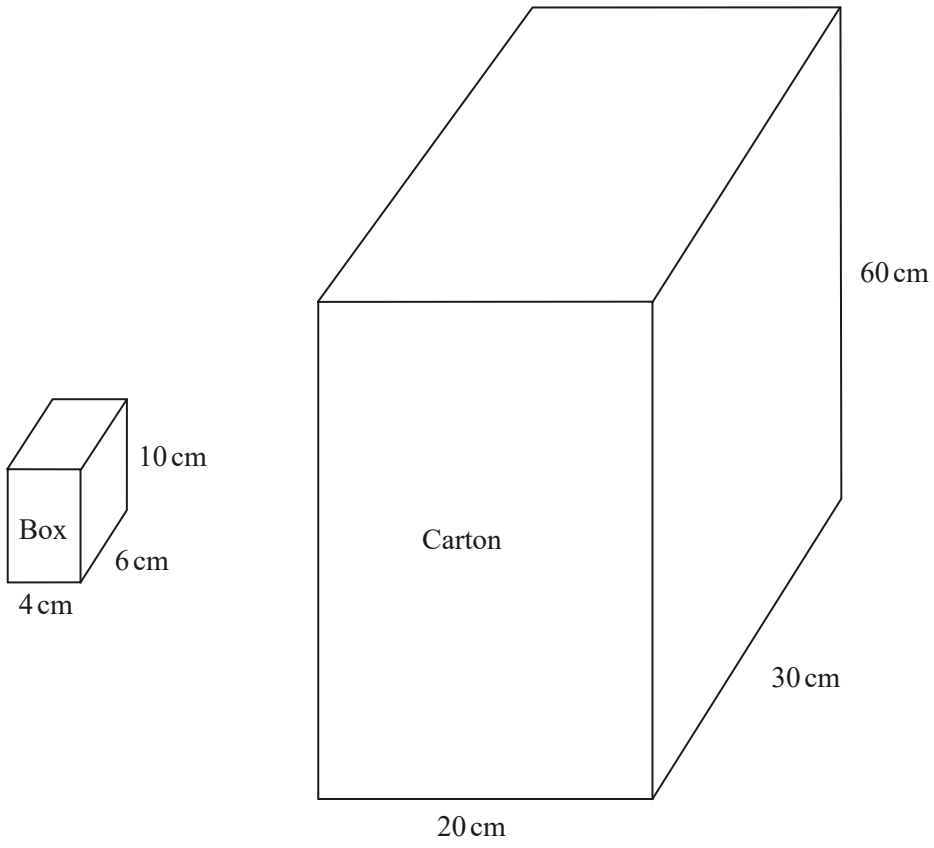
a length of 10 cm,
a width of 5 cm,
a height of 3 cm.

Work out the volume of the cuboid.

..... cm^3

(Total 2 marks)

19.



Diagrams **NOT** accurately drawn

Boxes are packed into cartons.

A box measures 4 cm by 6 cm by 10 cm.
A carton measures 20 cm by 30 cm by 60 cm.

The carton is completely filled with boxes.

Work out the number of boxes that will completely fill **one** carton.

.....

(Total 3 marks)

20. (a) How many faces has a cube?

.....

(1)

(b) The diagram shows a cuboid.

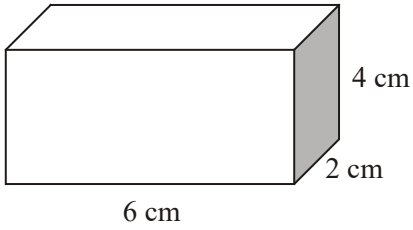


Diagram **NOT** accurately drawn

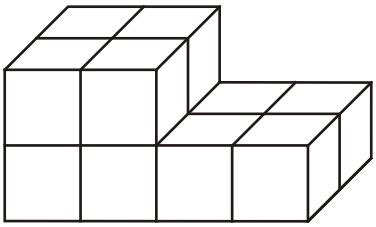
The length of the cuboid is 6 cm.
Its width is 2 cm.
Its height is 4 cm.

Work out the volume of the cuboid.

..... cm^3

(2)
(Total 3 marks)

21. The prism is made from centimetre cubes.

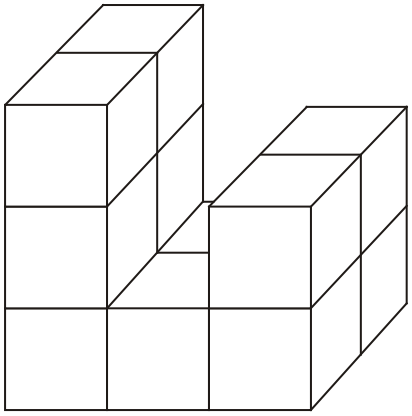


Find the volume of the prism.

..... cm^3

(Total 2 marks)

22. Here is a solid prism made from centimetre cubes.

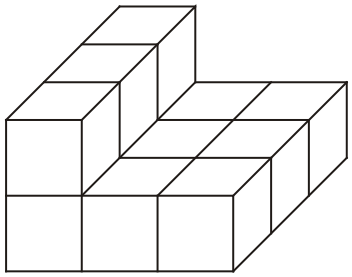


Work out the volume of the solid prism.

..... cm^3

(Total 2 marks)

23. Here is a solid prism made from centimetre cubes.

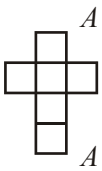


Find the volume of the prism.

..... cm^3

(Total 2 marks)

1. (a)



2

✓	×	
2	*0*	*B2*
1	*0*	*B1*
1	*1*	*B1*
2	*1*	*B1*

(b) 8

$2 \times 2 \times 2$

M1 for $2 \times 2 \times 2$

A1 for 8 cao

2

[4]

2. (a) (i) 4 1

B1 cao

(ii) 10 1

B1 cao

(b) 28 2

B2 for 28
(B1 for 29 or 14 × 2)

[4]

3. (a) (i) 11 2

B1 cao

(ii) 16

B1 cao

(b) Correct lines 2

See diagram

B2 cao for both lines correct
(B1 for one line correct)

(c) 12 2

B2 cao
(B1 for 11 or 13)

[6]

4. (a) 16 cm^2 2

B1 for 16
B1 (indep) for cm^2

(b) 18 1

B1 cao

(c) 10 2

B2 for 10
(B1 for 9 or 11 or 5 × 2 or evidence of length × width height eg 2 × 3 × 1, 2 × 3 × 2)

[5]

5. $(40 \div 10) \times (60 \div 20) \times (100 \div 10)$ 3
120

M1 attempt one division (eg 40 ÷ 10), may be implied by marks or number on one edge of diagram or by two of 4,3 and 10 seen
M1 (dep) for ("40 ÷ 10") × ("60 ÷ 20") × ("100 ÷ 10")
A1 cao
or
M1 for l0 × 20 × 10 or 40 × 60 × 100
M1 (dep) for "240000" ÷ "2000"
A1 cao

[3]

6. (a) 8 1

B1 cao

(b) 14 2

B2 for 14 (B1 for 13 or 15)

(c) 16 2

B2 for 16 (B1 for 15, 17 or 8)

[5]

7. (a) 18 1

B1 cao

(b) 14 1

B1 cao

(c) 27 2

B2 for 27
(B1 for 26, 28, or 17 or 9)

[4]

8. (a) 24 1

B1 cao

(b) 15 1

B1 cao

(c) 20 2

B2 cao
(B1 for 10 or 16 or 15)

[4]

9. (a) 14 1

B1 cao

(b) 6 1

B1 cao

(c) (Reflection) 1

B1 cao

(d) 12 1

B1 cao

[4]

10. (a) 16 1

B1 cao

(b) 12 cm^2 2

B1 for 12 cao, B1 (indep) for cm^2

(c) 15 2

M1 for 5 × 3
A1 cao [SC: B1 for 10, 13 or 14]

[5]

11. 87.75 2

M1 for 3 × 4.5 × 6.5 seen or implied eg from answer of 87.7 or 87.8 or 88 (with no other working shown)
A1 for 87.75 cao

[2]

12. (a) 480 2

$12 \times 10 \times 4$

M1 for 12 × 10 × 4
A1

(b) 240 1

B1 f.t.

[3]

13. (a) 22 **cm** 2

B1 for 22
B1 (indep) for cm

(b) 15 2

6 + 9

M1 for 5 × 3 or 6 + 6 + 3 o.e.
A1

[4]

14. (i) 12 1

B1

(ii) 22 2

B2 f.t for 2 × "(i)" – 2 correctly evaluated
(B1 for 21 ≤ answer ≤ 23)

[3]

15. 24, 2, 2 or 12, 4, 2
or 8, 6, 2 or 6, 4, 4 2

B2 for any correct combination with a product of 96
(B1 for sight of 96 or 3, 4, 8 or 2, 3, 16 or 3 even numbers < 24
with two < 10 and all three not the same)

[2]

16. (a) 20 × 5 × 30
3000 2

M1 for 20 × 5 × 30 (or 0.2 × 0.05 × 0.3)
A1 for 3000 or 0.003

[2]

17. A: 12.3 × 6 × 3 = 221.4
B: 9 × 8.7 × 2.8 = 219.24
A (with valid working) 3

M1 for 12.3 × 6 × 3 or 9 × 8.7 × 2.8
A1 for 221. .. or 219. .....
A1 for A (dep on M1 and both volumes correct to 3sf)

[3]

18. $10 \times 5 \times 3$ 2
$= 150 \text{ cm}^3$

M1 for 10 × 5 × 3
A1 cao

[2]

19. $60 \div 10 (= 6), 30 \div 6 (= 5), 20 \div 4 (= 5)$ 3
"6" × "5" × "5"
= 150

M1 for 60 ÷ 10 (or 6 seen) or 30 ÷ 6 (or 5 seen) or 20 ÷ 4 (or 5 seen)
[This maybe shown on the diagram in number or picture form]
M1 (dep) for "6" × "5" × "5"
A1 cao

Alternative
20 × 30 × 60 (= 36000)
4 × 6 × 10 (= 240)
"36000" ÷ "240"

Alternative
M1 for 20 × 30 × 60 (= 36000) or 4 × 6 × 10 (= 240)
M1 (dep) for "36000" ÷ "240"
A1 cao

*With our first method, the first M1 is for any of the 3 divisions shown (this may be implied by sight of for example, 4 × **5** = 20)*
***or** sight of 6 or 5 or 5 (this could be just on the diagram)*
***or** for the correct number of boxes (5 or 6) drawn on the diagram*
(Note: I have deleted the third method from the original scheme)
In the alternative method 240 ÷ 36000 could be awarded the M1 if the candidate is clearly trying to divide 36000 by 240 (an answer close to the correct answer would imply this but clearly an answer of something like 0.0066…… would not) Candidates often interpret 240 ÷ 36000 as '240 into 36000'.

[3]

20. (a) 6 1

B1 cao

(b) $6 \times 2 \times 4$
48 2

M1 for $6 \times 2 \times 4$ oe
A1 cao

[3]

21. 12 2

M1 for 6×2 or $4 + 4 + 2 + 2$
A1 for 12
If no working shown:
B2 for 12
(B1 for 10 or 11)

[2]

22. 6×2
12 2

M1 for 6×2 or answer of 11 or 13 or 6 seen
A1 cao

[2]

23. 12 2

B2 for 12 cao
(B1 for 10 or 11)

[2]

1. In part (a), there appeared to be some doubts about the meaning of "vertices". From the labelling, some candidates seemed to confuse vertices with edges, while others seemed to confuse them with faces. The success rate on part (b) was very low, wrong answers being seen much more often than the correct answer. The most frequent one was 28, the perimeter of the net, with 38, the sum of the perimeter and the lengths of the internal lines, and 24, the surface area, also appearing regularly. 6, which was occasionally given as the answer, may have been an unsuccessful attempt to evaluate 2^3.

2. Although both parts of this question were reasonably well answered, confusion between area and perimeter was evident in part (a) with the reversal of the two answers and answers of 4 to part (ii). In part (b), 40 ($4 \times 5 \times 2$) was the most popular wrong answer.

3. Many candidates could not differentiate between area and perimeter in part (a) but they gained more success in finding the area (68%) but only 45% could find the perimeter. Candidates were more successful in finding the lines of symmetry with 72% gaining both marks and in part (c) the correct volume was given by 63% of candidates. Here candidates usually missed out the hidden cubes in the prism.

4. Even though candidates were clearly told to state the units of their answer, many failed to write any units, whilst others just wrote cm. It was disappointing to find that candidates are still confusing area with perimeter, with over 60% of the candidates not able to provide the correct perimeter. Part (c) required candidates to find the volume of the prism with counting the cubes being the simplest method. Around a third of the candidates were successful in this task.

5. A common approach was to calculate the volume of the box and the volume of the packet and divide the former by the latter. Many candidates had difficulty dealing with the number of zeros in the multiplications (often giving 24 000, rather than 240 000, as the volume of the box) and in the final division. Many candidates adopted the alternative method and attempted to find out how many packets fitted into each side of the box, i.e. 3, 4 and 10. These candidates were often successful. Sometimes, though, the figures were added rather than multiplied, giving rise to a common incorrect answer of 17.

6. Fewer candidates than in the past are getting confused between area and perimeter. Whilst the first part of this question was completed successfully by over 60% of candidates, answers to parts (b) and (c) were more susceptible to careless mistakes. Just under a half of the marks were earned in these two parts.

7. **Foundation Tier**

This question was understood by candidates but caused the usual problems when candidates misunderstood the difference between perimeter and area. Candidates gained most success with find the volume by counting cubes, though they sometimes forgot the hidden ones.

Intermediate Tier

Part (a) was answered very well. Errors usually arose from candidates making a mistake when adding 5 or from giving a term in the sequence other than the 10th term. The most common incorrect answers were 42, 52 and 44 (obtained by doubling the 5th term). Finding the nth term of a sequence continues to cause problems at this level and in part (b) less than 20% of candidates answered (i) correctly. The most common incorrect answer was $n + 3$. Those who did find $3n$ sometimes either stopped or failed to find -7 correctly. $3n - 1$ was quite a common answer. It was apparent that many candidates did not read the question properly in (ii) because far too many gave only one number as the answer. This answer was usually a correct term, which showed some understanding but gained no marks.

8. It is disappointing to have to report that only slightly more than half of all candidates achieved the marks in any part of this question. Errors include confusion between area and perimeter, and errors in simple counting of lines, squares or cubes. Even more able candidates were found to have errors in this question.

9. There were many correct responses but a significant number of candidates confused perimeter with area and vice versa, scoring no marks. Around two thirds of the candidates got part (a) correct and/or part (b) correct.

In part (c) nearly all candidates got this correct with a few adding an extra square to give 4 squares in the top row.

In part (d) just under 60% got the correct volume. By far the most common error was to attempt to find the volume by multiplying a height by a width by a length, reaching 18 ($3 \times 3 \times 2$) or even 8 ($2 \times 2 \times 2$).

10. In parts (a) and (b), many candidates were confused in distinguishing between perimeter and area. Many gave 12 as their answer to part (a). In part (b), the omission of units was common, even when the area was correct. In part (c), many candidates successfully found the correct volume by working out 5×3 or more usually by simply counting the cubes. The most common errors seen were either calculations of $3 \times 3 \times 3$ (= 27) or mistakes in counting methods leading to answers of 13 and 14, which gained 1 mark, and sometimes 12 which gained no credit.

11. It was surprising how many candidates gave an incorrect answer for this question. It was clear that many did not have calculators, and struggled to multiply the three figures together; many answers suggested that a significant number resorted to guessing the answer. Some attempted to add the numbers, suggesting they did not know how to calculate volume, or were trying to find the edge length.

12. **Paper 11**

Working out the volume of the box produced a wide range of methods. Many realised that the result came from the triple multiplication $12 \times 4 \times 10$, but errors arose in the calculation leading to a loss in accuracy marks. Many then added the results of 12×4, 4×10 and 10×12 reaching an answer of 208. Other less successful methods included adding the three lengths together to get 26.
In part (b) calculating the number of sugar lumps was not handled well with only a few candidates scoring a mark on this question.

Paper 12

This was well answered, although arithmetic errors in the first part were not uncommon; many still managed to score 1 mark for showing $12 \times 4 \times 10$ however. A significant number of candidates calculated surface area, often correctly for no marks.
In the second part of the question, division by 4 (1 + 1 + 2), instead of by 2, appeared regularly.

13. Surprisingly counting the 1 cm edges of the squares was rarely done correctly even in those cases where the candidate had numbered the edges. The most common incorrect total was 21 with the inside corner causing some problems. The omission of the cm unit on the answer line lost the second mark in this part. Part (b) was often answered correctly but for some there appeared to be a visualisation difficulty as the candidates struggled to either count the 1 cm cubes or devise a mathematical way of working out the volume.

14. Finding the area of the top face of the prism could have been done by counting the squares. As many as 79% obtained the correct result. Finding the volume of the prism seemed more difficult as it required an allowance to be made for the half cubes at each end. Only 24% scored both available marks. Multiplying the area of the top face by two, without any account being made for the half cubes, produced an incorrect answer of '24', which was frequently seen.

15. Many candidates did not seem to understand what was required of them in this question. The most common answer was 24, 24, 24. Attempts at drawing the resulting cuboid seemed to clarify what was being asked and in 26% of the cases this led to one mark being scored with 10% overall scoring both marks. There was little connection to the total volume of 96. Nearly all candidates did provide some answer.

16. There were many correct answers to this question, but also a significant number of errors both arithmetical and conceptual. Surface area was often calculated instead of volume and 1500 (3000 ÷2) was not uncommon. 55 (20 +30 + 5) was also seen many times.

17. Foundation Tier

Fewer than 30% of the candidates were able to score any marks on this question. Adding the lengths proved to be far more popular than multiplying with 21.3 and 20.5 and 'A' being an extremely popular incorrect answer, scoring no marks. When the multiplication was performed, the decimal point in 'A' caused so many problems, yet not the **2 decimal points** in B. It was not uncommon to see A = 22.14 and B219.24
It was alarming to note that when the two volumes were correctly calculated and lined up next to each other, many candidates though219.24 was bigger than 221.4, possibly because the former had more digits than the latter, resulting in the candidates then thinking that 'B' had the greater volume! (I'm still reeling from this one!!!). Even though candidates were reminded to show all calculations, many only find the volume of one of the boxes before writing down 'A', which resulted in them losing a mark. Fewer than 20% scored all 3 available marks.

Intermediate Tier

Nearly two thirds of the candidates gained full marks in this question, correctly identifying the greater volume after accurately working out the volume of each cuboid. Failure to gain full marks was either a result of calculating one volume incorrectly or summing the dimensions of each cuboid instead of finding the product. A surprising number did the correct calculation but then selected the wrong box. It was common to see irrelevant methods for area or part-perimeter alongside correct working, without any indication which method the candidate preferred. Such choice of method invariably scores no marks.

18. Only about half of the candidates were able to find the volume of the cuboid, many tried to find the surface area and gained no credit.

19. Most candidates gained one mark by correctly finding the number of boxes that could be fitted in one the dimensions of the carton. These correct values, 5, 5 and 6, were often followed by an answer of 16 (5 + 5 + 6) or 30 (5 × 6)

Those candidates who chose to find the respective volumes of a box and a carton were often then able to correctly compute the maximum number of boxes, since they had access to their calculators. It must be said however that despite this many arithmetic errors were seen.

A common mistake by weaker candidates was to divide the sum of the dimensions of the carton by the sum of the dimensions of the box to give 110/20 = 5.5

20. (a) 87% of candidates correctly identified 6 as the number of faces of a cube.

(b) Although many candidates successfully computed the volume of the given cuboid, a great many did not. Often the product of 6, 4 and 2 was followed by division by 2 to give an incorrect answer of 24 cm^3. Many found the total or partial surface area. Many candidates also found the sum of the 12 edges. Unfortunately this did also give an answer of 48, however no credit was given.

12 cm^3 (6 × 4 ÷ 2) was a common error.

21. The correct answer of 12 (for two marks) was the most common answer seen although 11 and 10 (for one mark) were also seen. Many candidates who tried to show some working out usually failed to score any marks, 4 x 2 x 2 = 16 being a common error, attempting to find the volume of a cuboid. An answer of 18 was also not unusual, found by simply counting the number of visible faces.

12 cm^3 (6 × 4 ÷ 2) was a common error.

22. This standard question on finding the volume of a prism by counting cubes was not well understood with a success rate of only 45%. In 9% of cases candidates found the volume of the front face, or miscounted the volume by 1 cube.

23. Counting centimetre cubes, including 2 hidden cubes, was the approach expected of candidates in this question. A large proportion of the candidates attempted to do this but accuracy was not a strong point and “9”, “10”, “11” and “13” were frequently seen. 47% of candidates scored both marks in this question with a further 5% gaining 1 mark. Many candidates attempted to calculate the volume by working out lengths, sometimes more than 3, and multiplying them together.