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**GENERAL CERTIFICATE OF SECONDARY EDUCATION
MATHEMATICS SYLLABUS A**
Paper 1 (Foundation Tier)

J512/01

Solutions

Candidates answer on the question paper.

OCR supplied materials:
None

Other materials required:

- Geometrical instruments
- Tracing paper (optional)

**Monday 6 June 2011
Afternoon**

Duration: 2 hours



| | | | |
|---------------------------|--|--------------------------|--|
| Candidate forename | | Candidate surname | |
|---------------------------|--|--------------------------|--|

| | | | | | | | | | | |
|----------------------|--|--|--|--|--|-------------------------|--|--|--|--|
| Centre number | | | | | | Candidate number | | | | |
|----------------------|--|--|--|--|--|-------------------------|--|--|--|--|

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **100**.
- This document consists of **24** pages. Any blank pages are indicated.

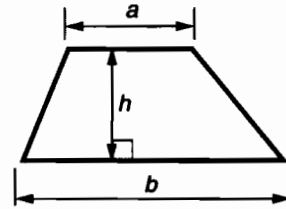
WARNING

No calculator can be used for this paper

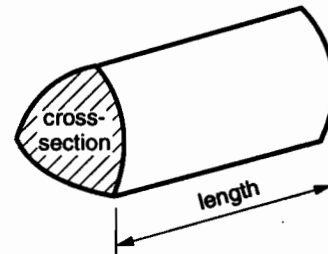


Formulae Sheet: Foundation Tier

$$\text{Area of trapezium} = \frac{1}{2} (a + b)h$$



$$\text{Volume of prism} = (\text{area of cross-section}) \times \text{length}$$

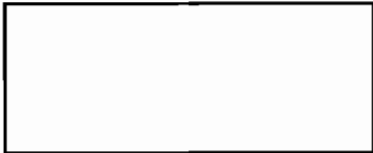
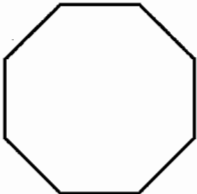
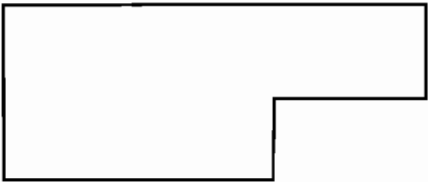
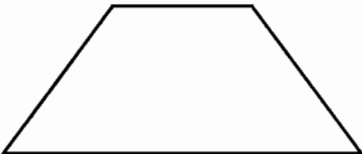
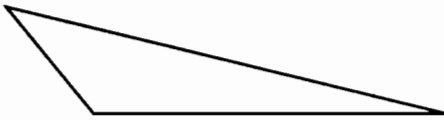
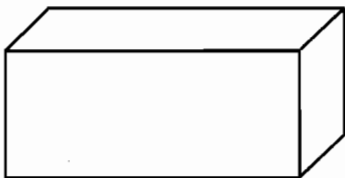


PLEASE DO NOT WRITE ON THIS PAGE



1 For each of these shapes three possible names are given.

Put a tick (✓) beside the correct mathematical name.
The first one has been done for you.

| | |
|---|--|
|  | square circle rectangle ✓ |
|  | octagon ✓ decagon hexagon |
|  | octagon pentagon hexagon ✓ |
|  | trapezium ✓ rhombus arrowhead |
|  | isosceles triangle equilateral triangle scalene triangle ✓ |
|  | cube cuboid ✓ cone |

[5]



- 2 Carlos did a survey to find out what fruit people liked. Some of his results are shown in the table.

| Fruit | Tally | Frequency |
|------------|-------|-----------|
| Strawberry | | 3 |
| Orange | | 9 |
| Apple | | 17 |
| Pear | | 7 |
| Mango | | 11 |

- (a) Complete the four spaces in the table. [2]

- (b) Which fruit was the most popular?

(b) Apple [1]

- (c) How many more people liked mango than strawberry? $11 - 3 = 8$

(c) 8 [1]

Carlos asked 50 people in his survey.

Twelve people did not answer, some people gave the name of one fruit and all the rest gave the names of two fruits.

- (d) How many people gave the names of two fruits?

$$11 + 7 + 17 + 9 + 3 = 47 \text{ answers } 47 - 38 = 9$$

$$50 - 12 = 38 \text{ people } \text{so } 9 \text{ named two fruits}$$

(d) 9 [3]



3 Work out.

(a) $166 + 383$

$$\begin{array}{r} 166 \\ + 383 \\ \hline 549 \end{array}$$

(a) 549 [1](b) $707 - 123$

$$\begin{array}{r} 6\cancel{1}07 \\ - 123 \\ \hline 584 \end{array}$$

(b) 584 [1](c) $144 \div 8$

$$8 \overline{)144} \begin{array}{l} 18 \\ 64 \\ \hline 80 \\ \hline 0 \end{array}$$

(c) 18 [1](d) 46×27

$$\begin{array}{r} 46 \\ \times 27 \\ \hline 322 \\ 920 \\ \hline 1242 \end{array}$$

or

| | | |
|----|-----|-----|
| | 40 | 6 |
| 20 | 800 | 120 |
| 7 | 280 | 42 |

$$\begin{array}{r} 800 \\ 120 \\ 280 \\ 42 \\ \hline 1242 \end{array}$$

(d) 1242 [3]

- 4 (a) Put a ring round each of the two fractions that are equivalent to $\frac{1}{4}$.

$\frac{21}{24}$

$\frac{3}{12}$

$\frac{21}{84}$

$\frac{4}{7}$

[2]

- (b) Put a ring round each of the two terms that are equivalent to 0.75.

75%

7.5%

$\frac{5}{7}$

$\frac{3}{4}$

$\frac{75}{10}$

[2]

- (c) Put a ring round each of the two terms that are equivalent to 30%.

0.03

0.3

$\frac{1}{3}$

$\frac{15}{20}$

$\frac{3}{10}$

[2]

- 5 (a) The first three even numbers are 2, 4 and 6.

Write down the next two even numbers.

(a) 8 10 [1]

- (b) 17 is an odd number.

Write down the odd numbers that come immediately before and immediately after 17.

.....
(b) 15 19 [2]



- 6 A recipe book gives this rule to find the cooking time for a leg of lamb.

| |
|---|
| $\text{cooking time in minutes} = 30 \times \text{weight in pounds} + 30$ |
|---|

- (a) Dave is cooking a leg of lamb.
It weighs 4 pounds.

Work out the cooking time in minutes.

$$\begin{aligned} & 30 \times 4 + 30 \\ = & 120 + 30 \\ = & 150 \text{ minutes} \end{aligned}$$

(a) 150 minutes [2]

- (b) Ann is cooking a larger leg of lamb.
It weighs $8\frac{1}{2}$ pounds.

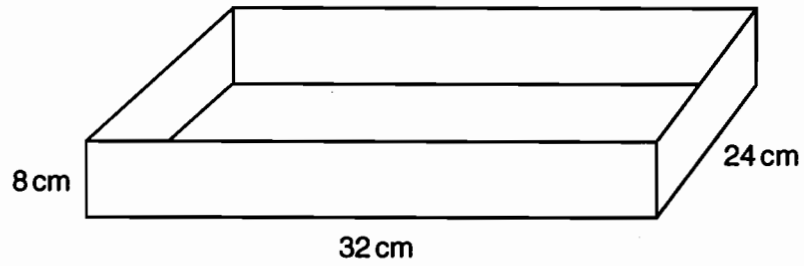
Work out the cooking time.
Give your answer in hours and minutes.

$$\begin{aligned} & 30 \times 8\frac{1}{2} + 30 \\ 8 \times 30 & = 240 \\ \frac{1}{2} \times 30 & = 15 \\ \text{extra } 30 & = 30 \\ 285 \text{ minutes} & = 4 \text{ hrs } 45 \text{ mins} \end{aligned}$$

(b) 4 hours 45 minutes [3]



- 7 Jo keeps the paper for her printer in an open-top box. Its base is a rectangle and its height is 8 cm.

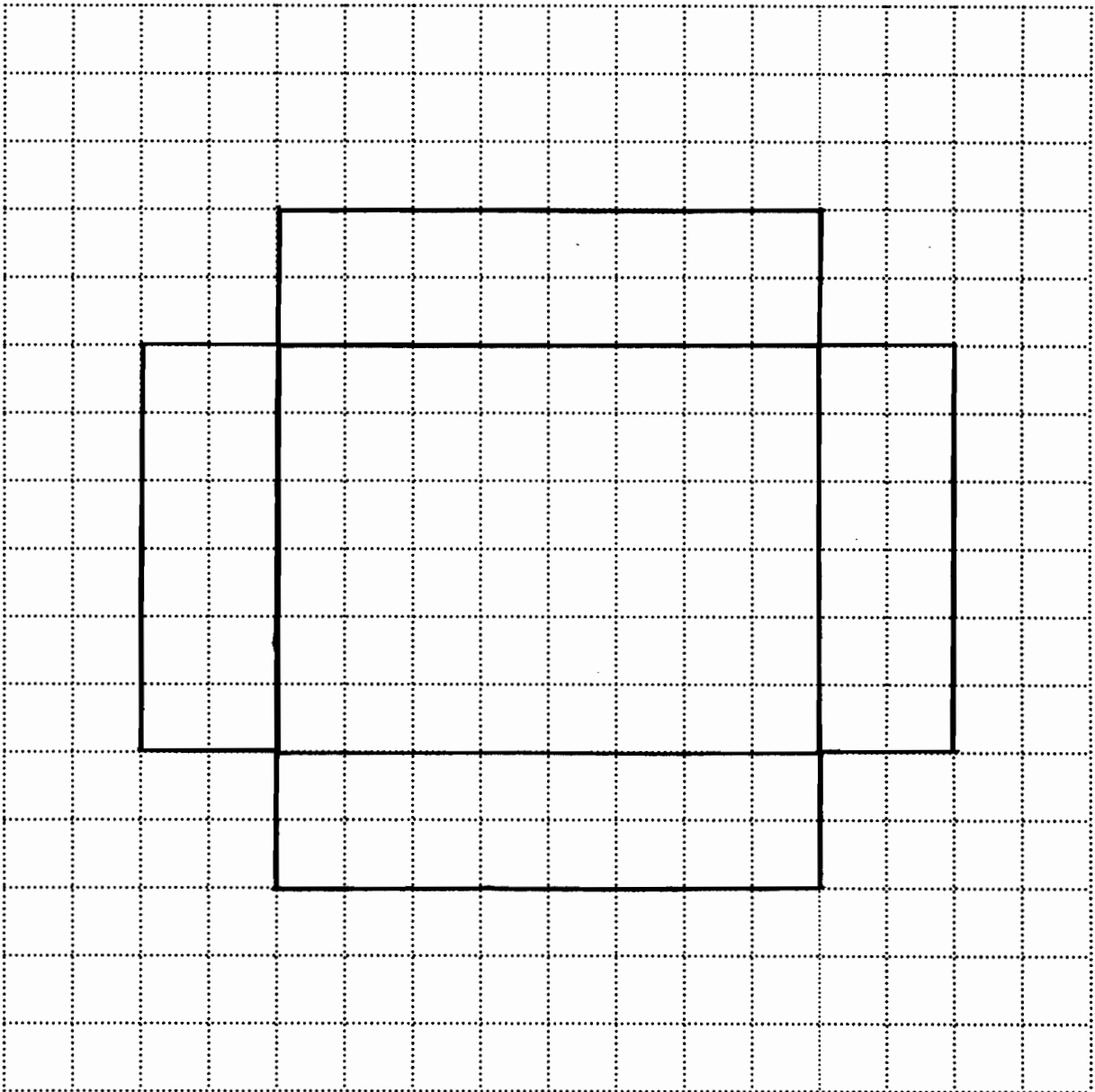


- (a) Use the centimetre grid below to draw a net of this box.
Use a scale of 1 cm to represent 4 cm.

$$32 \div 4 = 8 \text{ cm}$$

$$24 \div 4 = 6 \text{ cm}$$

$$8 \div 4 = 2 \text{ cm}$$



[3]



(b) Jo has 400 sheets of paper.

(i) 15% of the sheets are yellow.

Work out how many yellow sheets Jo has.

$10\% \text{ of } 400 = 40$

$5\% \text{ of } 400 = 20$

$15\% \text{ of } 400 = 60$

.....
.....

(b)(i) 60 [2]

(ii) Each sheet of Jo's paper is 0.08 mm thick.

What is the height of her pile of 400 sheets?

400×0.08

32.00

.....
.....

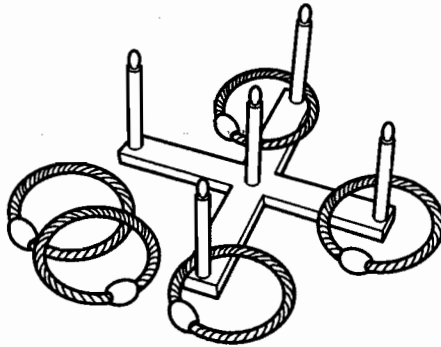
(ii) 32 mm [2]

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- 8 Sam and Lizzie are playing a game in their garden.

On each turn they throw five rings and count how many they get over a peg.
The picture shows a game in which Lizzie has scored 3.



- (a) Lizzie plays ten times.
Here are her scores.

0 0 0 0 1 1 2 2 3 5

- (i) What is the median of Lizzie's scores? ↑

Median halfway between 5th and 6th

(a)(i) _____ | _____ [1]

- (ii) Lizzie plays for an eleventh time.

Explain why the median of her scores will not change.

Median will be $\frac{11+1}{2} = 6^{\text{th}}$ item and this is also |

_____ [1]



- (b) Sam plays ten times.
Here are his scores.

1 1 2 2 2 3 3 4 5 5

- (i) Work out the mean of Sam's scores.

$$\frac{1+1+2+2+2+3+3+4+5+5}{10}$$

$$= \frac{28}{10} = 2.8$$

(b)(i) 2.8 [3]

Sam plays for an eleventh time.

- (ii) What is the largest amount by which he can improve his mean score?

If he scores 5

$$\text{mean will be } \frac{28+5}{11} = \frac{33}{11} = 3$$

Can improve mean by $3 - 2.8 = 0.2$

(ii) 0.2 [3]



- 9 (a) What is the square of 1?

$$1^2 = 1 \times 1 = 1$$

(a) _____ 1 _____ [1]

- (b) Work out.

(i) $2^3 + \sqrt{9}$

$$= 8 + 3 = 11$$

(b)(i) _____ 11 _____ [2]

(ii) $\sqrt[3]{125}$

$$\text{cubic root of } 125 = 5 \text{ since } 5 \times 5 \times 5 = 125$$

(ii) _____ 5 _____ [1]

(iii) 0.8×0.5

(iii) _____ 0.4 _____ [1]

- (c) (i) Ken thinks that 21 is a prime number.

Give a reason why he is wrong.

$$7 \times 3 = 21$$

so 21 has factors other than 1 and itself [1]

- (ii) Write down the next prime number after 13.

(c)(ii) _____ 17 _____ [1]



10 Here is part of the train timetable for the Esk Valley railway line in Yorkshire.

Whitby to Middlesbrough

| | | | | | | |
|---------------|------|------|------|------|------|------|
| Whitby | - | - | - | 0852 | - | 1241 |
| Grosmont | - | - | - | 0909 | - | 1258 |
| Danby | - | - | - | 0930 | - | 1319 |
| Battersby | - | - | - | 0953 | - | 1342 |
| Nunthorpe | 0719 | 0830 | 0916 | 1005 | 1216 | 1354 |
| Middlesbrough | 0729 | 0843 | 0929 | 1018 | 1228 | 1407 |

Middlesbrough to Whitby

| | | | | | | |
|---------------|------|------|------|------|------|------|
| Middlesbrough | 1449 | 1647 | 1740 | 1754 | 1949 | 2044 |
| Nunthorpe | 1503 | 1659 | 1751 | 1808 | 2003 | 2055 |
| Battersby | - | - | 1803 | - | - | 2111 |
| Danby | - | - | 1825 | - | - | 2129 |
| Grosmont | - | - | 1846 | - | - | 2150 |
| Whitby | - | - | 1907 | - | - | 2211 |

Malcolm catches the 0852 from Whitby to Middlesbrough.

When he returns from Middlesbrough he catches the 1754 to Nunthorpe where he meets a friend.

He then catches the next train from Nunthorpe to Whitby.

How many minutes does he spend altogether on these three train journeys?

$$0852 \text{ to } 1018 = 8 + 60 + 18 = 86 \text{ mins}$$

$$1754 \text{ to } 1808 = 6 + 8 = 14 \text{ mins}$$

$$2055 \text{ to } 2211 = 5 + 60 + 11 = 76 \text{ mins} +$$

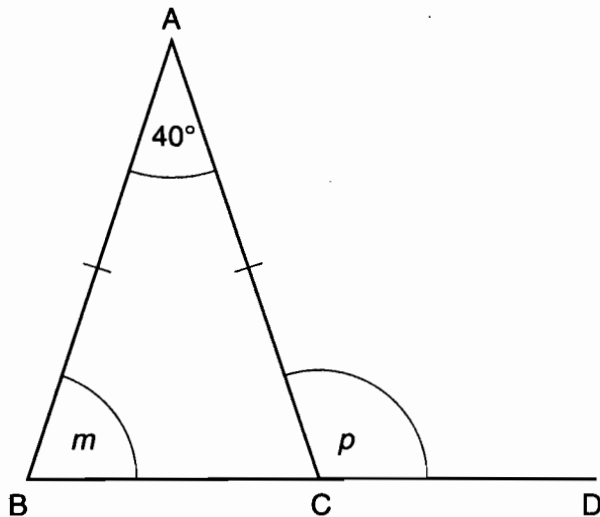
176

176

minutes [3]



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NOT TO SCALE

Triangle ABC is isosceles with angle A = 40°. BCD is a straight line.

(a) Calculate the size of angle m.

$$\frac{180 - 40}{2} = \frac{140}{2} = 70^\circ$$

.....

(a) 70 ° [2]

(b) Calculate the size of angle p. Give a reason for your answer.

$$180 - 70 = 110$$

.....

p = 110 ° because angles on a straight line add up to 180° [2]



DO NOT WRITE IN THIS MARGIN

12 This stem and leaf diagram shows the heights in centimetres of some cactus plants. The shortest plant is 2.3 cm high.



Key: 2 | 3 represents 2.3 cm

(a) Complete the key.

or 5 | 2 represents 5.2 cm [1]
or similar to these

(b) Another cactus plant is 3.8 cm high.

Add this height to the stem and leaf diagram.

[1]

The diagram is now complete.

(c) How many plants are now represented in the diagram?

.....
(c) 22 [1]

(d) What is the range of the heights of the plants?

longest - shortest

5.6 - 2.3 = 3.3

.....
(d) 3.3 cm [1]

(e) What is the modal height?

occurs the most

.....
(e) 4.3 cm [1]



13 (a) Solve.

(i) $10x = 420$

$$x = \frac{420}{10} = 42$$

.....
(a)(i) $x = 42$ [1]

(ii) $y - 7 = 29$

$$y = 29 + 7 = 36$$

.....
(ii) $y = 36$ [1]

(b) Simplify.

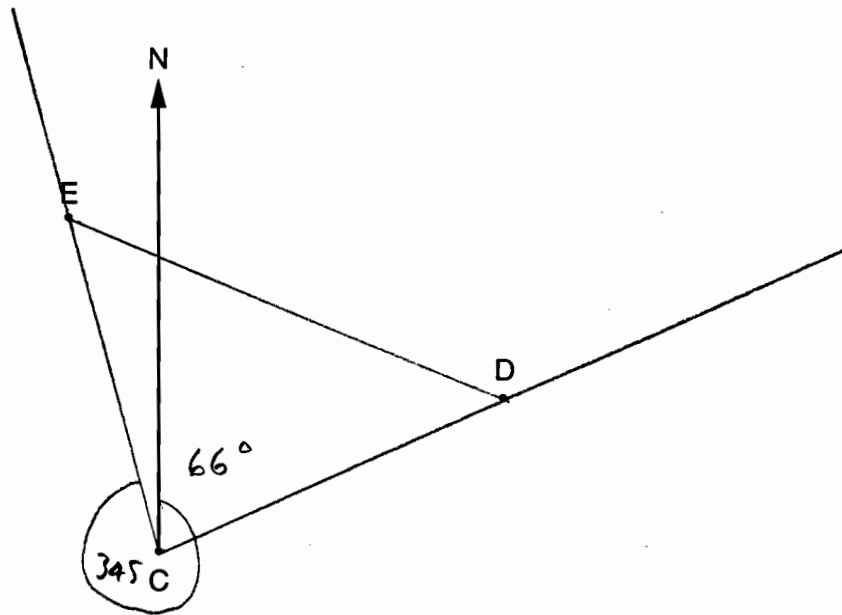
$$t \times t \times t \times t \times t = t^5$$

.....
(b) t^5 [1]



14 This diagram shows three towns C, D and E.

The scale is 1 cm represents 20 miles.



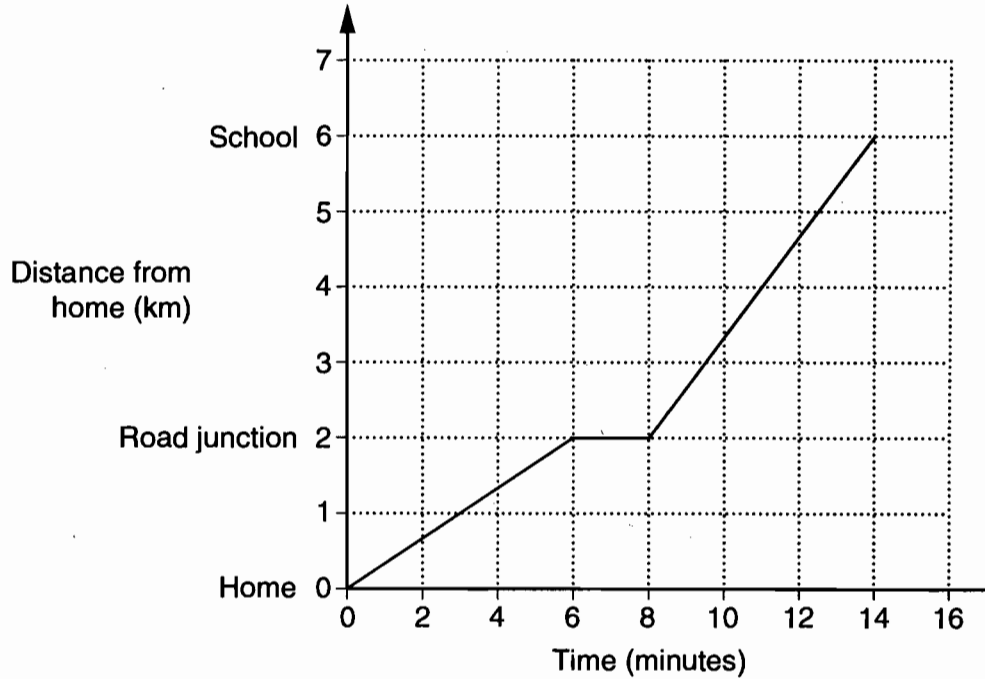
$$6.2 \times 20 \text{ miles} \\ = 124 \text{ miles}$$

Complete these sentences.

- (a) The bearing of town D from town C is 066°. [1]
- (b) The bearing of town E from town C is 345°. [1]
- (c) The distance from town D to town E is 124 miles. [2]



- 15 Laura's mum drove her to school one morning. The graph represents their journey.



Complete this description of their journey from home to school.

| | |
|--------------------------|--------------------------|
| <u>2 km in 6 min</u> | <u>4 km in 6 min</u> |
| <u>= 20 km in 60 min</u> | <u>= 40 km in 60 min</u> |
| <u>= 20 km/h</u> | <u>= 40 km/h</u> |

From home to the road junction they travelled at a constant speed of 20 km/h.

When they reached the road junction they stopped for 2 minutes.

After the road junction they travelled at a constant speed of 40 km/h until they reached school.

[6]



16 Solve.

(a) $\frac{x}{2} = 8$

$x = 8 \times 2 = 16$

(a) $x = 16$ [1]

(b) $3(2x - 5) = 30$

$6x - 15 = 30$

$6x = 30 + 15$

$6x = 45$

$x = \frac{45}{6}$

$x = 7\frac{3}{2}$

(b) $x = 7\frac{1}{2}$ [3]



- 17 (a) Tom had £50.
He bought a bike for £46.

What percentage of the £50 did Tom spend on the bike?

$$\frac{46}{50} \times 100 = 92\%$$

(a) 92 % [2]

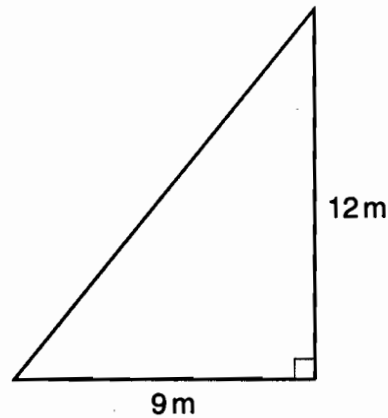
- (b) A company makes pork pies in two sizes.
The smaller pork pies each weigh 820g.
The larger pork pies weigh $17\frac{1}{2}\%$ more than the smaller ones.

Work out the weight of one of the larger pork pies.

| | |
|---------------------------------------|---------|
| 10% of 820g = 82g | 820 |
| 5% of 820g = 41g | 143.5 + |
| $2\frac{1}{2}\%$ of 820g = 20.5g | 963.5 |
| so $17\frac{1}{2}\%$ of 820g = 143.5g | |

(b) 963.5 g [3]





NOT TO SCALE

- (a) (i) Work out the area of this triangle. $\frac{1}{2}$ base \times height

$$\frac{1}{2} \times 9 \times 12 = \frac{108}{2} = 54 \text{ m}^2$$

(a)(i) 54 m² [2]

- (ii) Change your answer to part (a)(i) to an area in cm².

$$54 \times 100 \times 100$$

(ii) 540000 cm² [1]

- (b) Work out the length of the hypotenuse of the triangle.

Let hypotenuse be x

By Pythagoras $x^2 = 9^2 + 12^2$

$$x^2 = 81 + 144 = 225$$

$$x = \sqrt{225} = 15$$

(b) 15 m [3]

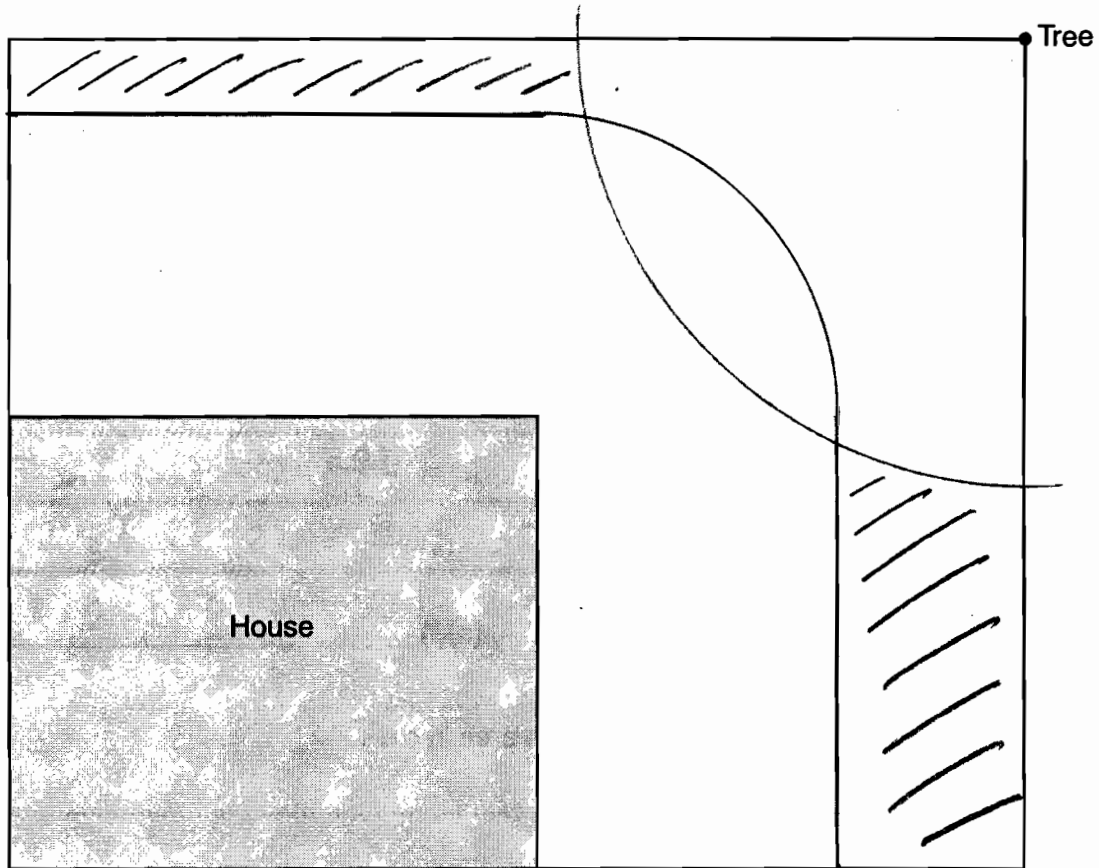
TURN OVER FOR QUESTION 19



19 Use ruler and compasses in this question.

The diagram is a scale drawing of a house and its garden.
There is a tree in one corner of the garden.

The scale is 1 cm represents 2 m.



A second tree is to be planted in the garden.
It must be

- more than 8 m from the house, $8\text{ m} \rightarrow 4\text{ cm}$
- more than 12 m from the first tree. $12\text{ m} \rightarrow 6\text{ cm}$

On the diagram construct accurately and shade the regions where the second tree can be planted.

[6]

