



Centre Number

71	
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Candidate Number

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General Certificate of Secondary Education  
January 2014

## Mathematics

Unit T2

(With calculator)



Foundation Tier

MV18
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[GMT21]

FRIDAY 10 JANUARY, 9.15 am–10.45 am

### TIME

1 hour 30 minutes, plus your additional time allowance.

### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

Complete in blue or black ink only.

Answer **all twenty-nine** questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You **may** use a calculator for this paper.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Functional Elements will be assessed in this paper.

Quality of written communication will be assessed in

**Questions 1 and 16(b).**

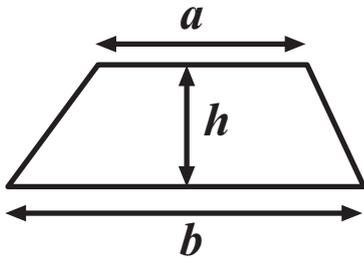
You should have a calculator, ruler, compasses and a protractor.

The Formula Sheet is on page 3.

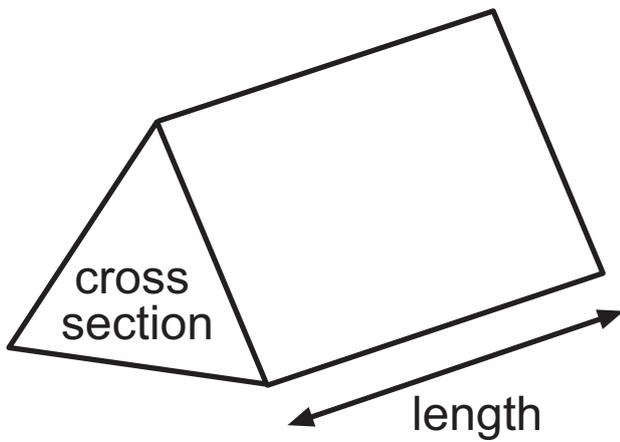
You are provided with an A3 insert for use with **Question 8.**

# Formula Sheet

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



Volume of prism = area of cross section  $\times$  length



**Quality of written communication will be assessed in this question.**

- 1 (a) Work out the value of  $2^2 \times 3^3$  showing each step of your working. [2 marks]

Answer \_\_\_\_\_

(b) Which of the following fractions is nearest in value to  $\frac{1}{4}$ ?  
[2 marks]

$$\frac{2}{10} \quad \frac{3}{20} \quad \frac{7}{30} \quad \frac{11}{40}$$

Show clearly how you reach your answer.

Answer \_\_\_\_\_

2 (a) From the numbers in the list below

24 56 81 40 25 66 59 90 27

(i) write down a square number, [1 mark]

Answer \_\_\_\_\_

(ii) write down a cube number. [1 mark]

Answer \_\_\_\_\_

(b) Martha's grandmother's age on her next birthday will be both a square number and a cube number at the same time.

What age is Martha's grandmother now? [2 marks]

Answer \_\_\_\_\_

**3** Anne bought pink and blue ribbon for her Nursery School.

She bought 3.2 metres of pink ribbon and 2.6 metres of blue ribbon and paid the shopkeeper £8.89

The pink ribbon cost £1.60 per metre.

How much did the blue ribbon cost per metre? [4 marks]

**Show clearly how you worked out your answer.**

Answer £ \_\_\_\_\_

4

Year	2008	2009	2010	2011	2012
Rainfall (cm)	60.5	62.5	62.0	61.0	

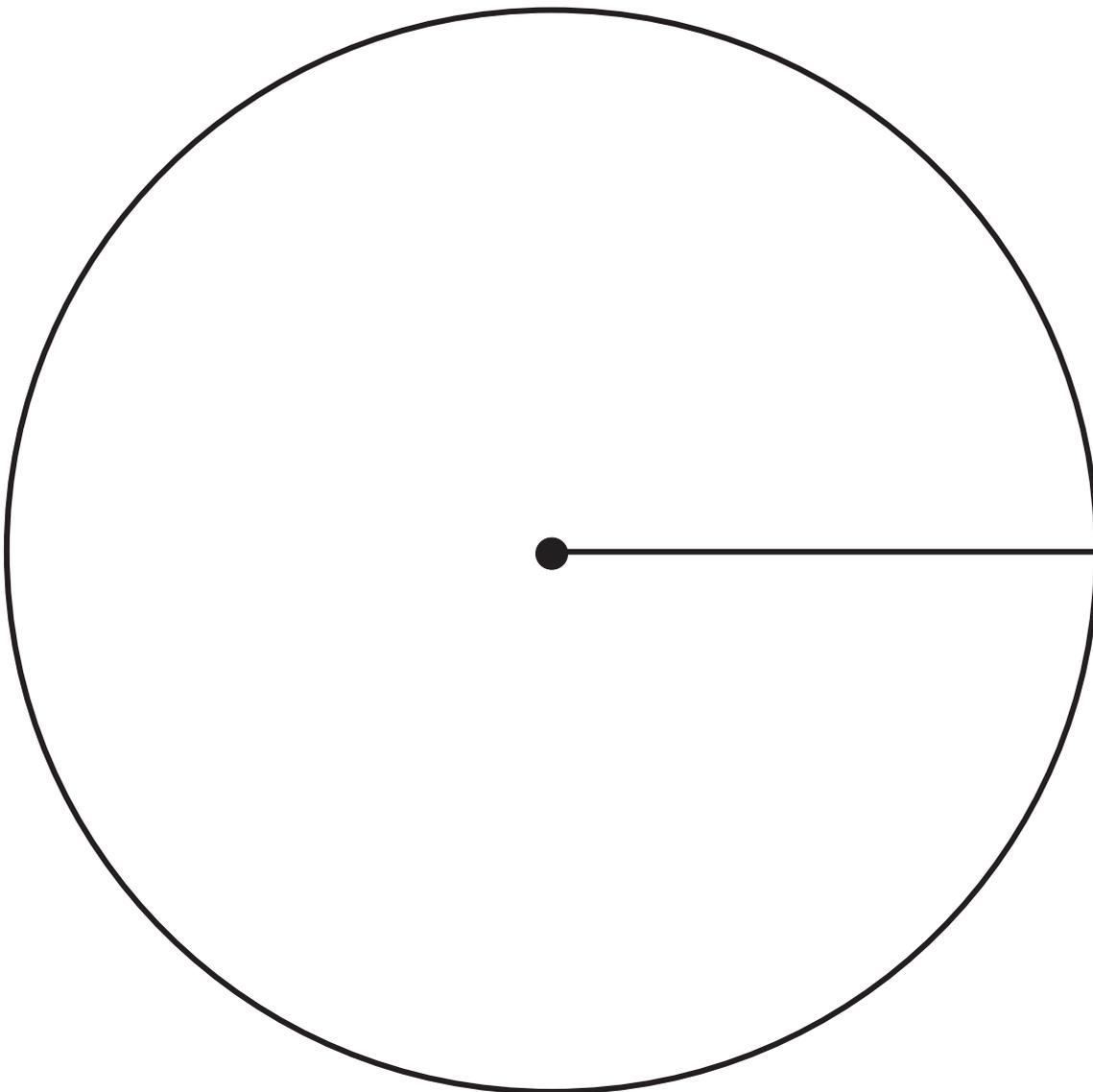
The mean rainfall over these 5 years was 62 cm. What was the rainfall in 2012? [3 marks]

Answer \_\_\_\_\_ cm

- 5 The table below shows the number of pairs of shoes of different colours sold in a shop one day.

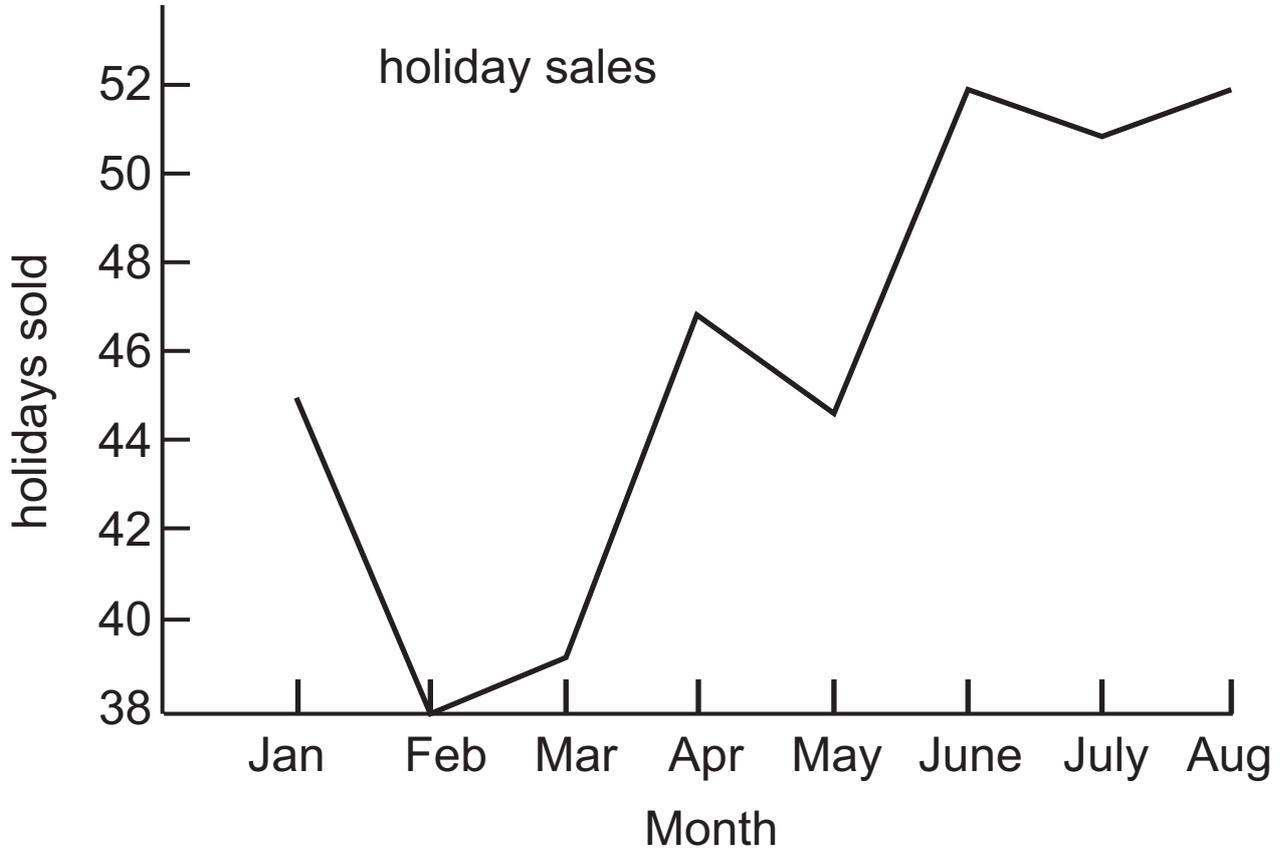
Colour	Black	Brown	Blue	Other
Number	35	20	18	17
Angle				

Draw a clearly labelled pie chart to show the number of pairs of shoes of each colour. [4 marks]

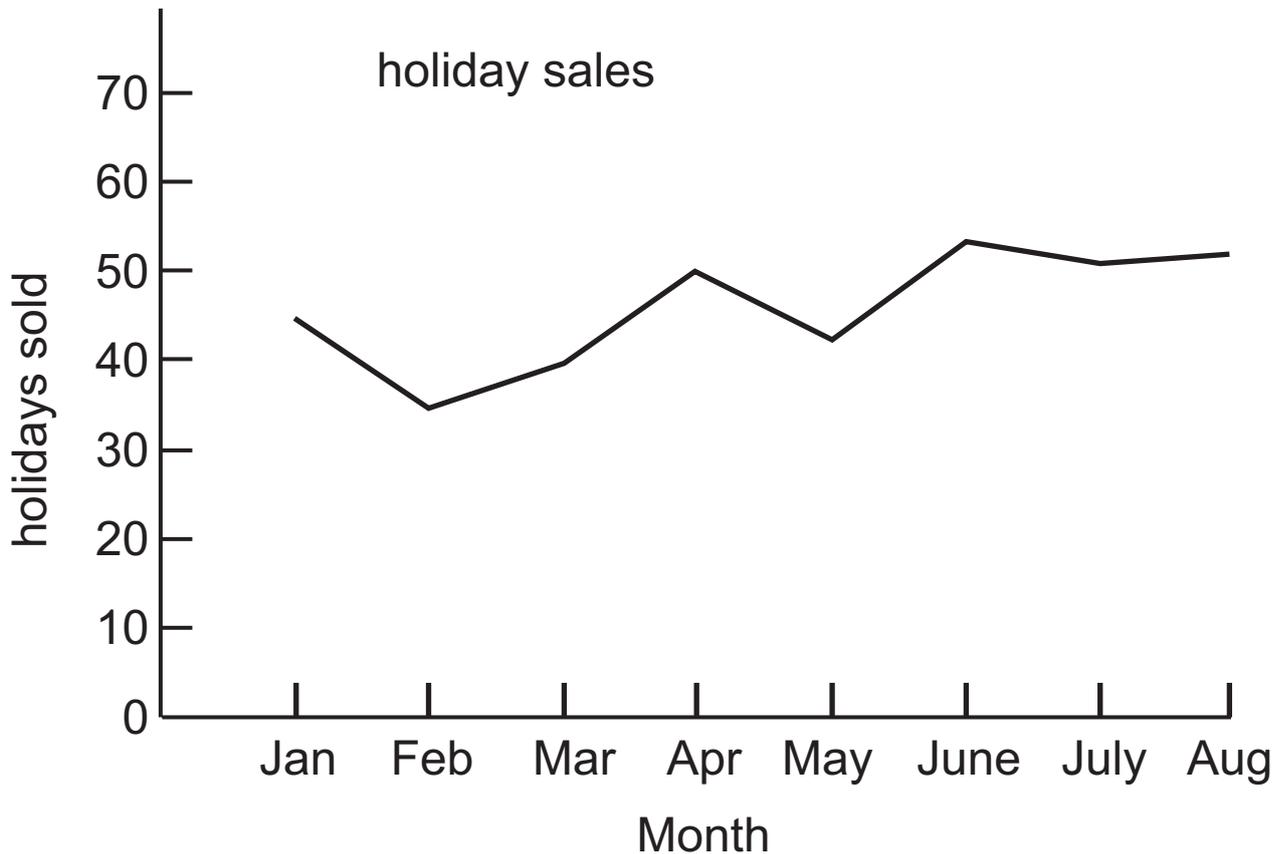


6 The two graphs below show similar information but look different.

Graph A



Graph B



(a) Which graph appears to show the biggest increase in sales? [1 mark]

Answer Graph \_\_\_\_\_

(b) What causes this graph to be misleading? [1 mark]

Answer \_\_\_\_\_

- 7 Calculate the size of angle  $x$  in the diagram below.  
[3 marks]

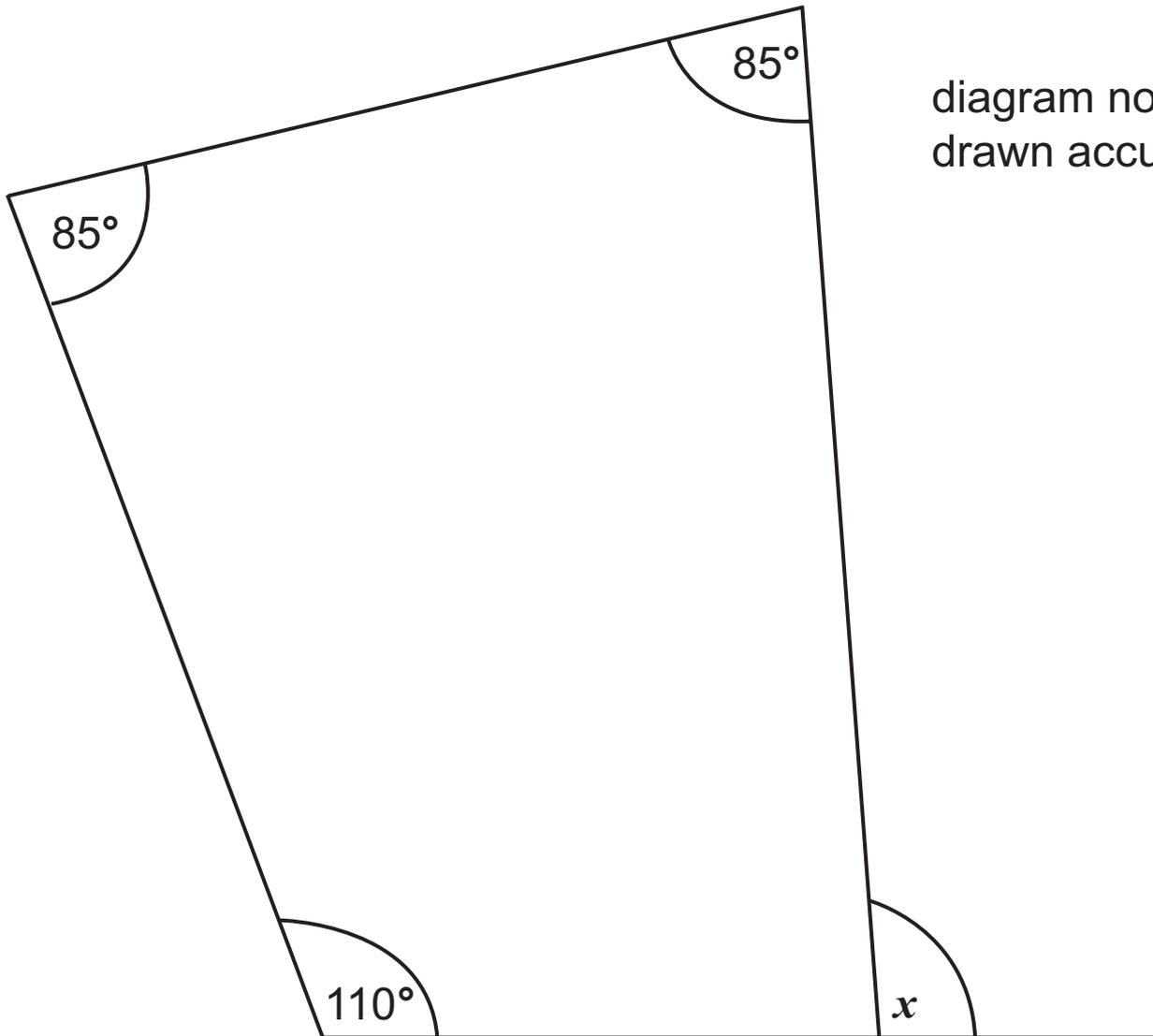


diagram not  
drawn accurately

Answer  $x =$  \_\_\_\_\_  $^\circ$

8 Using the A3 insert provided answer the following parts (a), (b) and (c) to this question.

(a) Sarah takes the 1134 train from Portadown to Belfast Central.

How long should the journey take? [1 mark]

Answer \_\_\_\_\_ minutes

(b) James is in Portadown. He has to be in Holywood by 5 pm. What is the latest train he could take from Portadown? [1 mark]

Answer \_\_\_\_\_

(c) Using this train service, but not starting in Portadown, Joshua made a journey which lasted exactly 2 hours 7 minutes. What is the earliest time his journey could have started? [1 mark]

Answer \_\_\_\_\_

**9** A rectangle measures 7.6 cm by 4.8 cm.

Calculate

**(a)** the area of this rectangle, [3 marks]

Answer \_\_\_\_\_

**(b)** the perimeter of this rectangle. [1 mark]

Answer \_\_\_\_\_ cm

10 (a) Simplify [2 marks]

$$5x + 2y - 3x - 5y$$

Answer \_\_\_\_\_

(b) Solve [2 marks]

$$7x - 3 = 18$$

Answer  $x =$  \_\_\_\_\_

(c) Solve [1 mark]

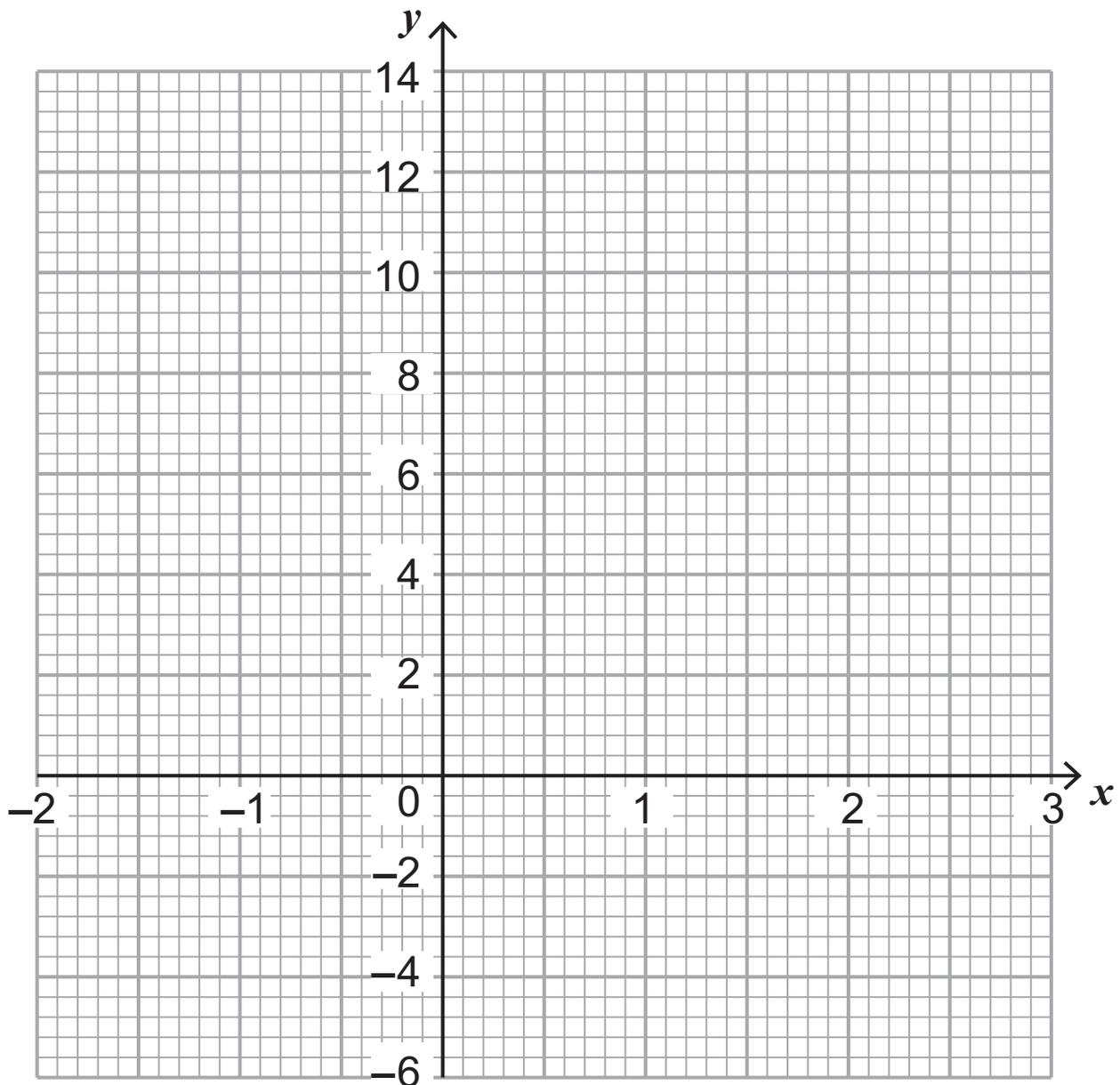
$$\frac{x}{20} = 2$$

Answer  $x =$  \_\_\_\_\_

- 11 (a) Complete the table of values for the equation  $y = 3x + 5$   
[1 mark]

$x$	-2	-1	0	1	2	3
$y$	-1		5	8		14

- (b) On the grid below, draw the graph of  $y = 3x + 5$   
between  $x = -2$  and  $x = 3$  [2 marks]



- (c) Draw the line  $x = 2$  on the same grid. [1 mark]

**12** Hugh is a travelling salesman. He claims 24.6p for each km he travels and £27.60 for meals on each day he is travelling.

If he travels more than 700 km in any week he adds 12.5% to his total claim.

Last week Hugh travelled 915 km in 5 days.

How much did Hugh claim for last week? [5 marks]

**Show clearly how you arrived at your answer.**

Answer £ \_\_\_\_\_

**13 (a)** Write down two numbers which are square roots of 49  
[1 mark]

Answer \_\_\_\_\_ and \_\_\_\_\_

**(b)** Explain the meaning of  $0.\dot{1}0\dot{3}$  [1 mark]

Answer \_\_\_\_\_

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**(Questions continue overleaf)**

**14** The table shows the temperature of some liquids as they cool in a freezer.

Time (minutes)	5	10	15	18	25	30	30
Temperature ( $^{\circ}\text{C}$ )	35	31	24	22	12	7	6

**(a)** Draw a scatter graph for this data on the grid opposite.  
[2 marks]

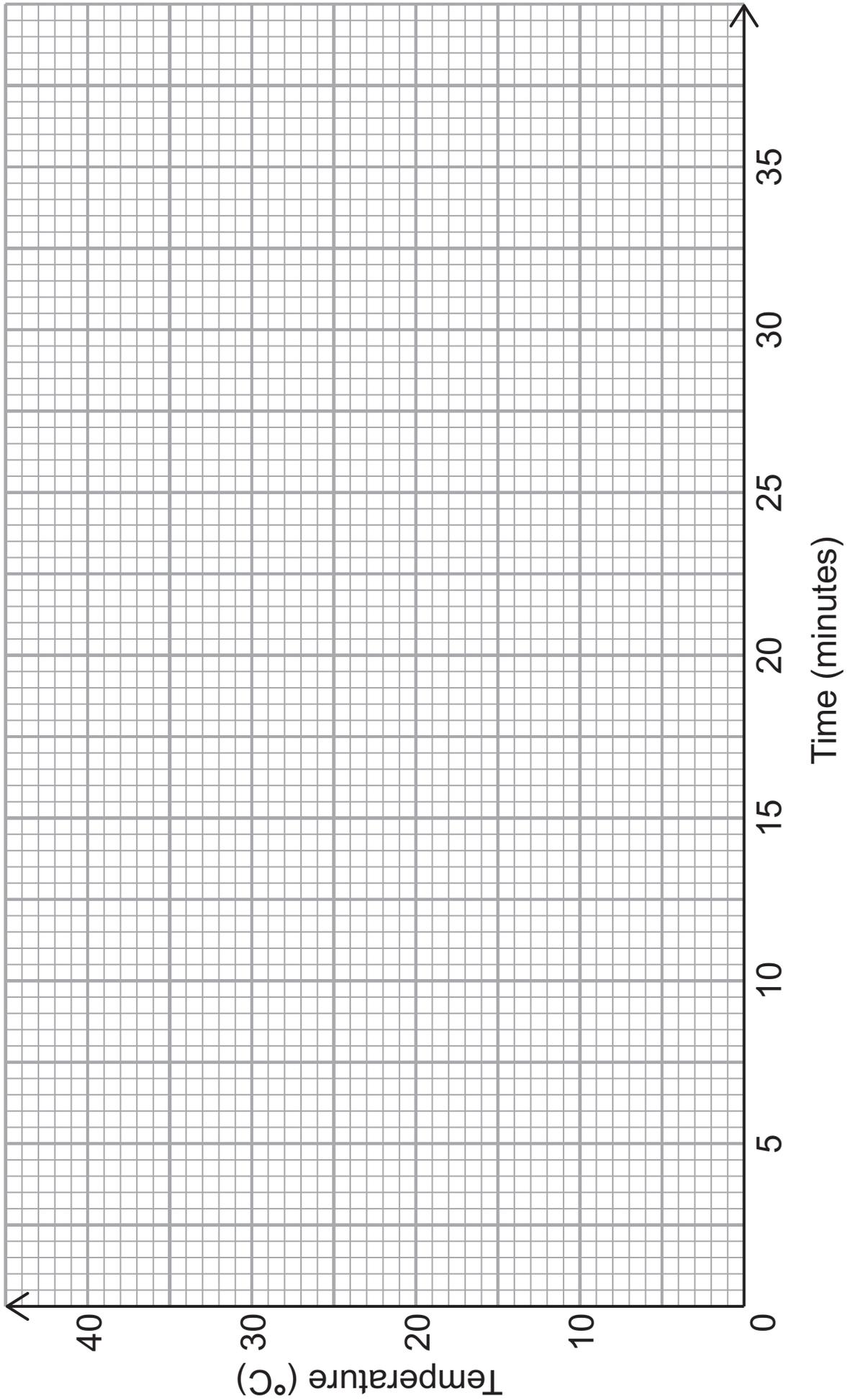
**(b)** Draw a line of best fit. [1 mark]

**(c)** Estimate the time taken for a liquid to reach freezing point ( $0^{\circ}\text{C}$ ). [1 mark]

Answer \_\_\_\_\_ minutes

**(d)** Describe the correlation. [1 mark]

Answer \_\_\_\_\_



**15** Twenty two pupils were asked to record the time (in minutes) they spent on their homework last Monday night.

Their responses are listed below.

40 55 80 60 50 55 65 40 120 100 90  
55 60 110 100 120 75 50 80 85 60 45

Construct a stem and leaf diagram to illustrate this data.  
[3 marks]

Quality of written communication will be assessed in part (b) of this question.

- 16 (a) Calculate the size of the interior angle of a regular pentagon. [2 marks]

Answer \_\_\_\_\_ °

- (b) Three regular pentagons are placed together as shown below.

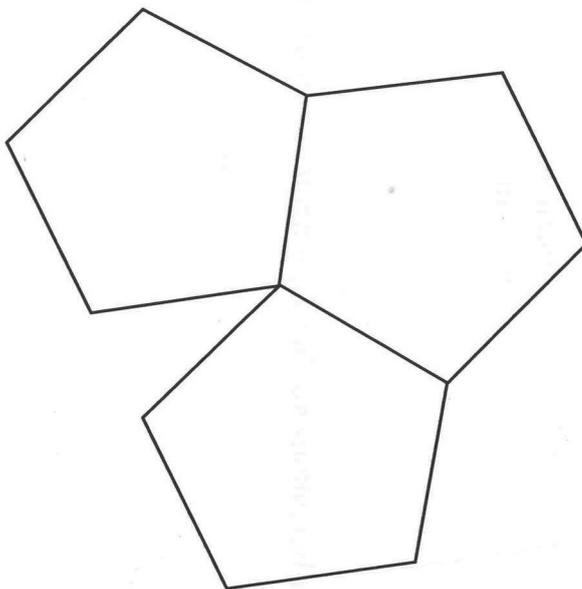


diagram not  
drawn accurately

Explain why you cannot cover a floor with regular pentagonal tiles. [2 marks]

Answer \_\_\_\_\_

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17 The radius of the base of a cylindrical oil tank is 60 cm.

(a) Calculate the area of the base of the oil tank. [2 marks]

Answer \_\_\_\_\_ cm<sup>2</sup>

The height of the oil tank is 70 cm.

(b) Calculate the volume of the oil tank. Give your answer in **litres**. [3 marks]

Answer \_\_\_\_\_ litres

- 18** Angela buys 5 DVDs and 4 CDs.  
Each DVD costs  $d$  pounds. Each CD costs  $c$  pounds.  
Write down an expression for the total cost. [2 marks]

Answer \_\_\_\_\_

- 19** The  $n^{\text{th}}$  term of a sequence is given by  $n^2 - 1$

- (a)** Write down the first 3 terms of this sequence. [2 marks]

Answer \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

- (b)** Explain why 101 cannot be a term in this sequence.  
[1 mark]

Answer \_\_\_\_\_

- 20** Solve  $7e + 3 = 4e + 5$  [3 marks]

Answer  $e =$  \_\_\_\_\_

**21 (a)** Express 84 as a product of its prime factors **in index form**. [3 marks]

Answer \_\_\_\_\_

**(b)** Find the Lowest Common Multiple (LCM) of 63 and 84 [2 marks]

Answer \_\_\_\_\_

**22** The weight of a cow increases from 147 kg to 165 kg.

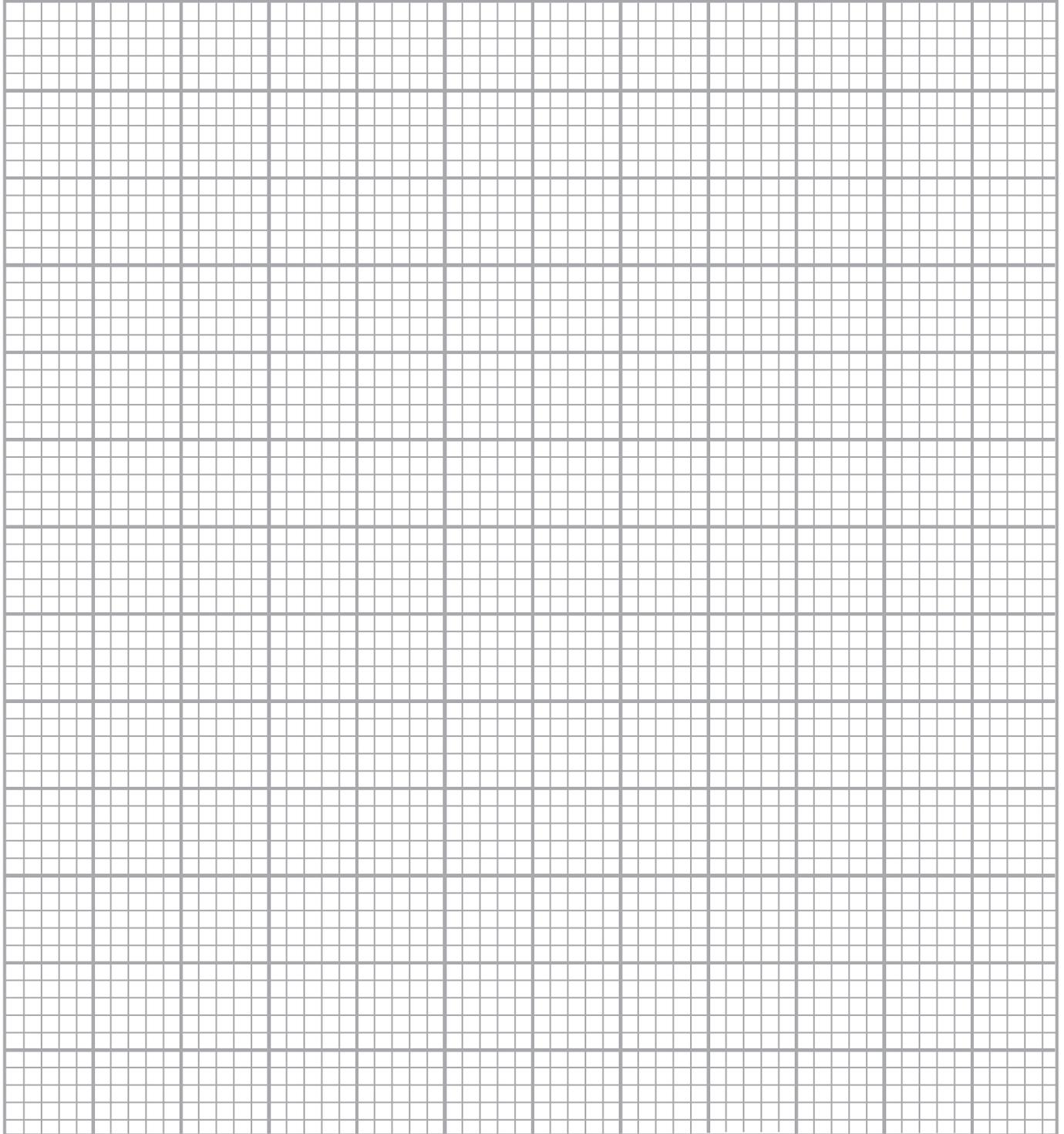
What is the percentage increase in the weight of the cow?  
[3 marks]

Answer \_\_\_\_\_ %

**23** The table below shows the weights of fish caught in a competition.

<b>Weight (g)</b>	<b>Frequency</b>
$0 < w \leq 150$	10
$150 < w \leq 300$	25
$300 < w \leq 450$	18
$450 < w \leq 600$	12
$600 < w \leq 750$	10
$750 < w \leq 900$	5

Draw a frequency polygon for this data. [3 marks]



**24** A student wishes to carry out a survey relating to television viewing by the general public.  
Her first question is

**“What age are you?”**

**Answer**

**(a)** Give one criticism of this question. [1 mark]

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**(b)** Design a more suitable question with appropriate response boxes for her to record the age of those being surveyed. [2 marks]

**25** The first five terms of a sequence are 9, 13, 17, 21, 25  
Find an expression, in terms of  $n$ , for the  $n^{\text{th}}$  term of this sequence. [2 marks]

Answer \_\_\_\_\_

**26** A glass window is in the shape of a semi-circle with diameter 40 cm.

Calculate the perimeter of the semi-circle. [3 marks]

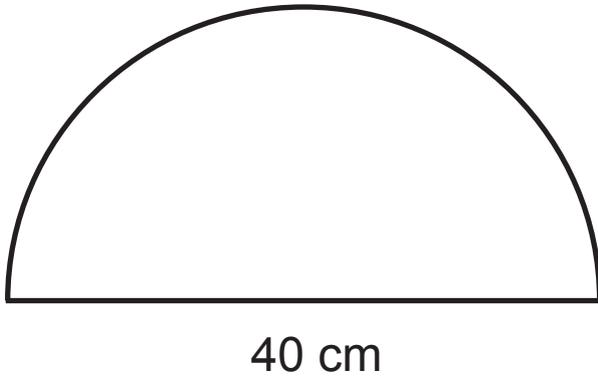


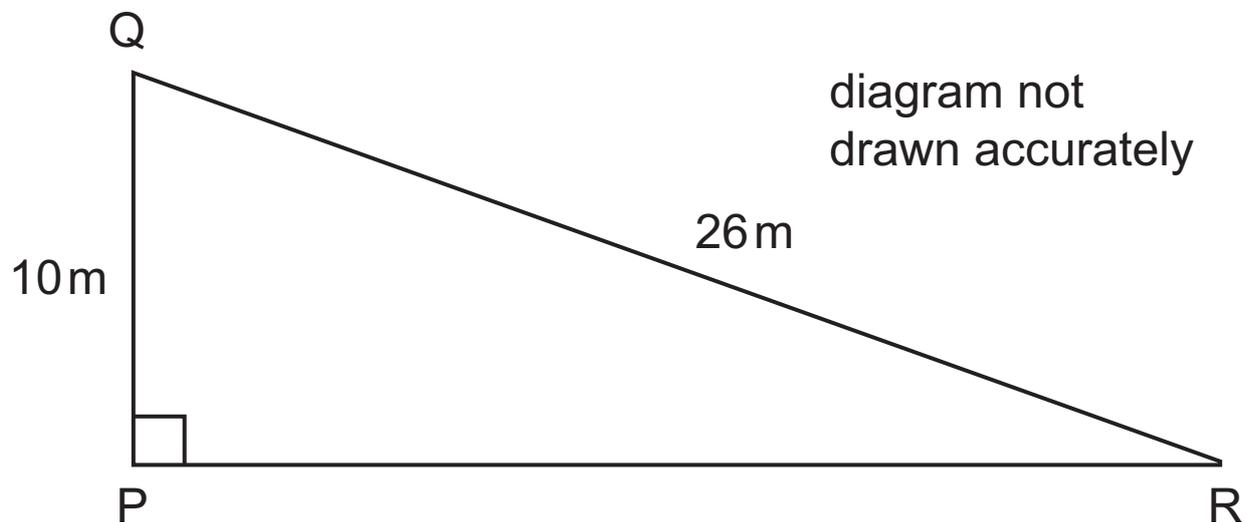
diagram not  
drawn accurately

Answer \_\_\_\_\_ cm

**27** The sketch shows a field which is in the shape of a right-angled triangle.

The side  $PQ = 10\text{ m}$  and the side  $QR = 26\text{ m}$ .

Calculate the length of the side  $PR$ . [3 marks]



Answer \_\_\_\_\_ m

**28** Expand and simplify  $3(2w - 1) - 2(w - 4)$  [2 marks]

Answer \_\_\_\_\_

- 29** Use the method of trial and improvement to find the solution to the equation  $x^3 + 3x = 47$   
Give your answer correct to 1 decimal place. [4 marks]  
**Show all your working.**

Answer  $x =$  \_\_\_\_\_

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**THIS IS THE END OF THE QUESTION PAPER**

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**SOURCES**

Q8 Translink Timetable, Source - - - - © Adapted from Translink Timetable (www.translink.co.uk). With kind permission

For Examiner's use only	
Question Number	Marks
1	
2	
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<b>Total Marks</b>	
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Examiner Number

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This insert is for use with Question 8.

Dublin Connolly	1000	1300	1600
Newry <b>L</b>	1112	1412	1712
Poyntzpass			
Scarva			
Portadown	0845 0945 1045 <b>1134</b> 1145 1245 1345 <b>1434</b> 1445 1545 1645 <b>1734</b> 1745 1845		
Lurgan	0851 0951 1051 <b>1144</b> 1151 1251 1351   1451 1551 1651   1751 1851		
Moira	0857 0957 1057   1157 1257 1357   1457 1557 1657   1757 1857		
Lisburn	0910 1010 1110 <b>1203</b> 1210 1310 1410   1510 1610 1710   1810 1910		
Hilden	0912 1012 1112   1212 1312 1412   1512 1612 1712   1812 1912		
Lambeg	0914 1014 1114   1214 1314 1414   1514 1614 1714   1814 1914		
Derriaghya	0916 1016 1116   1216 1316 1416   1516 1616 1716   1816 1916		
Dunmurry	0919 1019 1119   1219 1319 1419   1519 1619 1719   1819 1919		
Finaghy	0922 1022 1122   1222 1322 1422   1522 1622 1722   1822 1922		
Balmoral	0924 1024 1124   1224 1324 1424   1524 1624 1724   1824 1924		
Adelaide	0926 1026 1126   1226 1326 1426   1526 1626 1726   1826 1926		
Great Victoria Street	0930 1030 1130   1230 1330 1430   1530 1630 1730   1830 1930		
Great Victoria Street	0834 0934 1034 1134   1234 1334 1434   1534 1634 1734   1834 1934		
City Hospital	0837 0937 1037 1137   1237 1337 1437   1537 1637 1737   1837 1937		
Botanic	0839 0939 1039 1139   1239 1339 1439   1539 1639 1739   1839 1939		
Belfast Central <b>M</b>	0842 0942 1042 1142 <b>1216</b> 1242 1342 1442 <b>1507</b> 1542 1642 1742 <b>1807</b> 1842 1942		
Belfast Central	0845 0945 1045 1145   1245 1345 1445   1545 1645 1745   1845 1945		
Titanic Qtr (Bridge End)	0848 0948 1048 1148   1248 1348 1448   1548 1648 1748   1848 1948		
Sydenham <b>✈</b>	0851 0951 1051 1151   1251 1351 1451   1551 1651 1751   1851 1948		
Hollywood	0855 0955 1055 1155   1255 1355 1455   1555 1655 1755   1855 1955		
Marino	0857 0957 1057 1157   1257 1357 1457   1557 1657 1757   1857 1957		
Cultra	0859 0959 1059 1159   1259 1359 1459   1559 1659 1759   1859 1959		
Seahill	0902 1002 1102 1202   1302 1402 1502   1602 1702 1802   1902 2002		
Helen's Bay	0905 1005 1105 1205   1305 1405 1505   1605 1705 1805   1905 2005		
Carnalea	0909 1009 1109 1209   1309 1409 1509   1609 1709 1809   1909 2009		
Bangor West	0911 1011 1111 1211   1311 1411 1511   1611 1711 1811   1911 2011		
Bangor	0916 1016 1116 1216   1316 1416 1516   1616 1716 1816   1916 2016		