Centre Number

71

Candidate Number

Rewarding Learning

General Certificate of Secondary Education
January 2014

Mathematics

Unit T2

(With calculator)

Foundation Tier

MV18

[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.

8691.03 **MV18**

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)**.
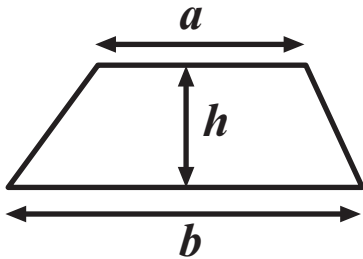
You should have a calculator, ruler, compasses and a protractor.
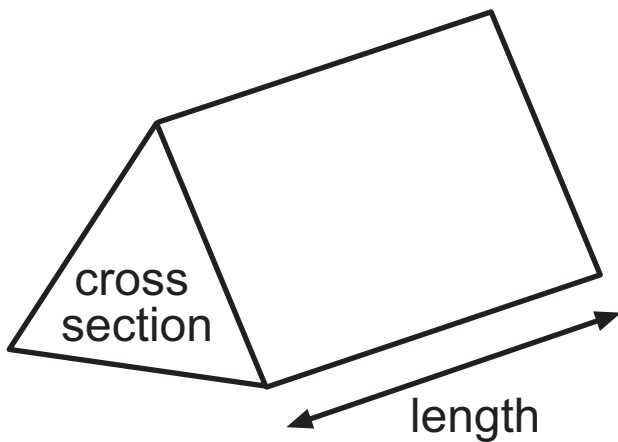
The Formula Sheet is on page 3.

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 × 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]

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

Show clearly how you reach your answer.

Answer _____

5

[Turn over

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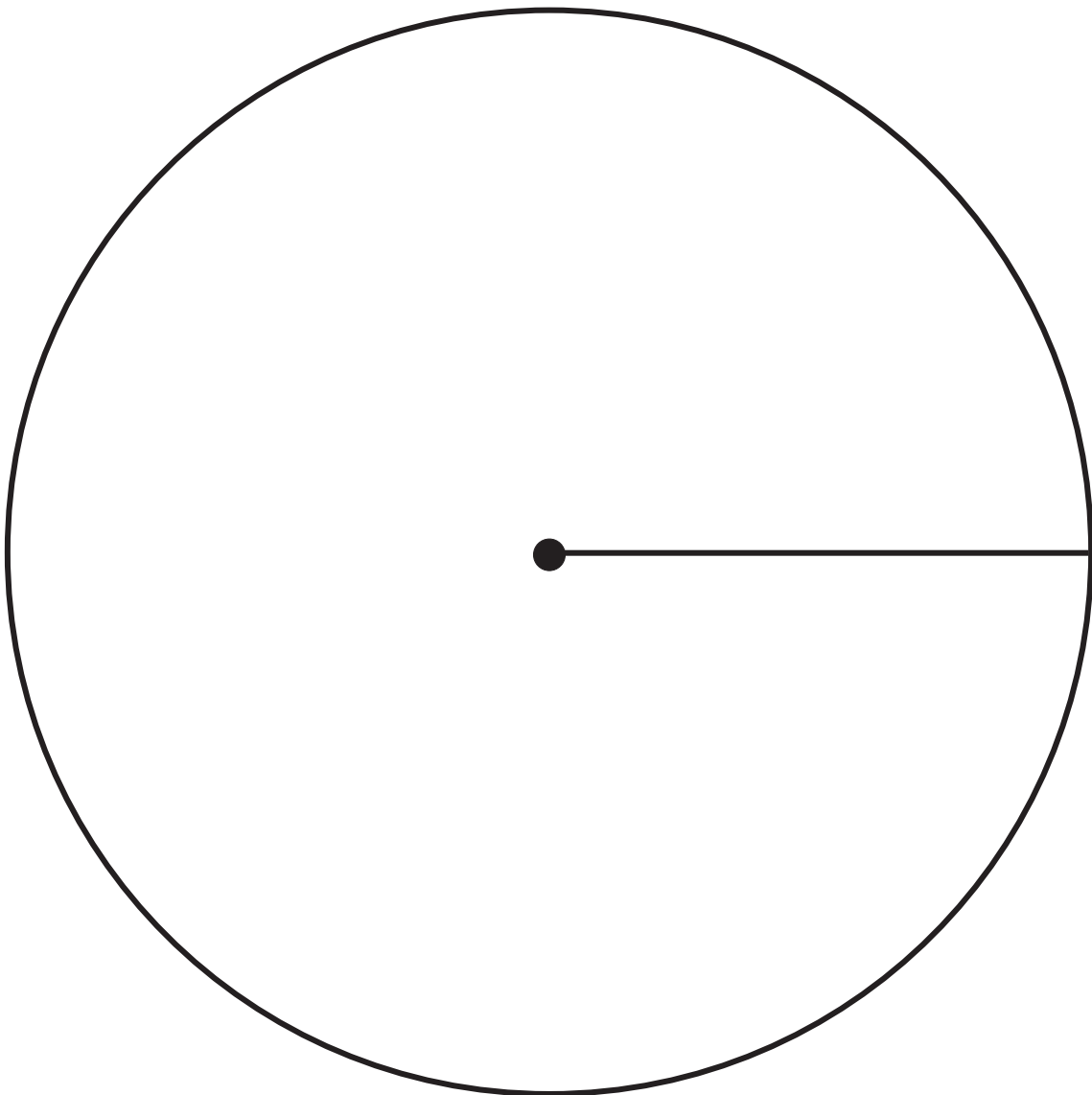
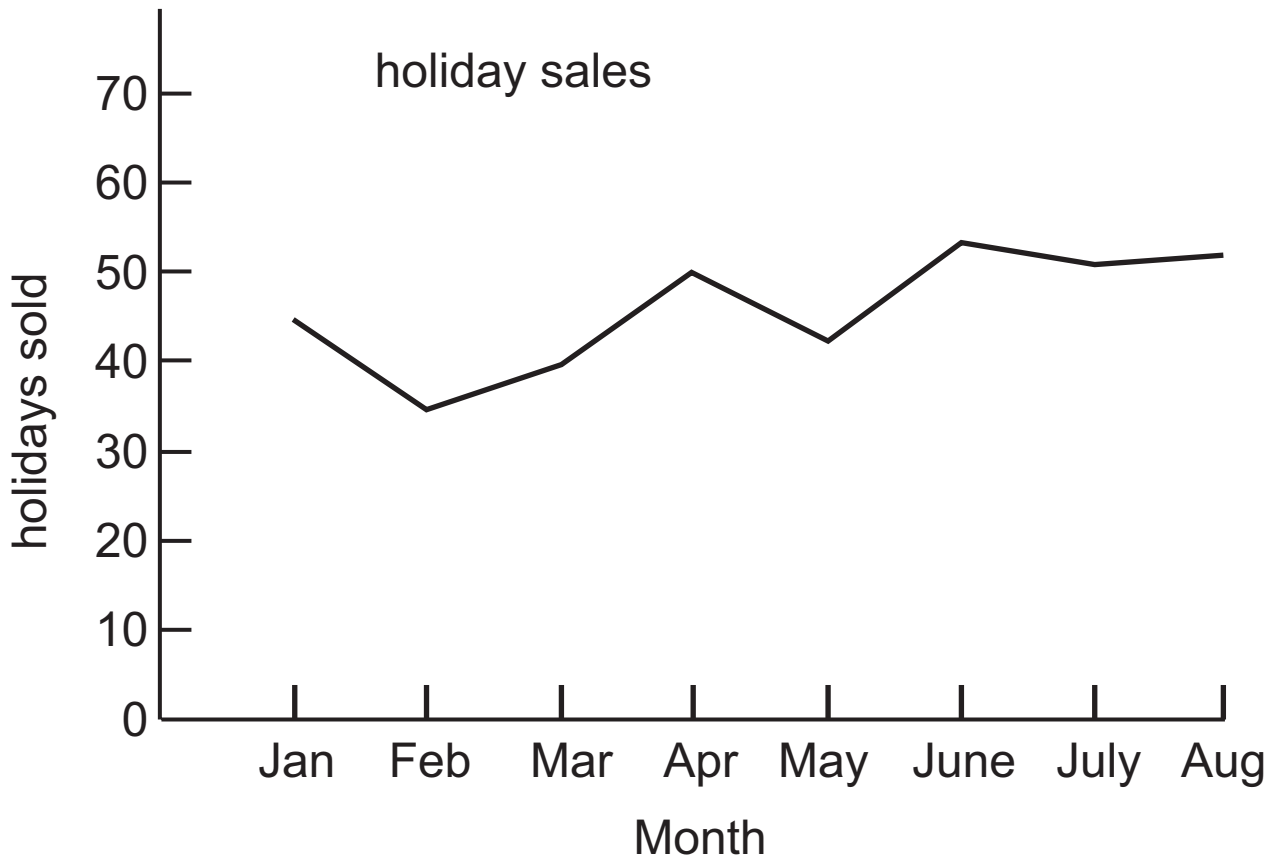**6** The two graphs below show similar information but look different.

Graph A
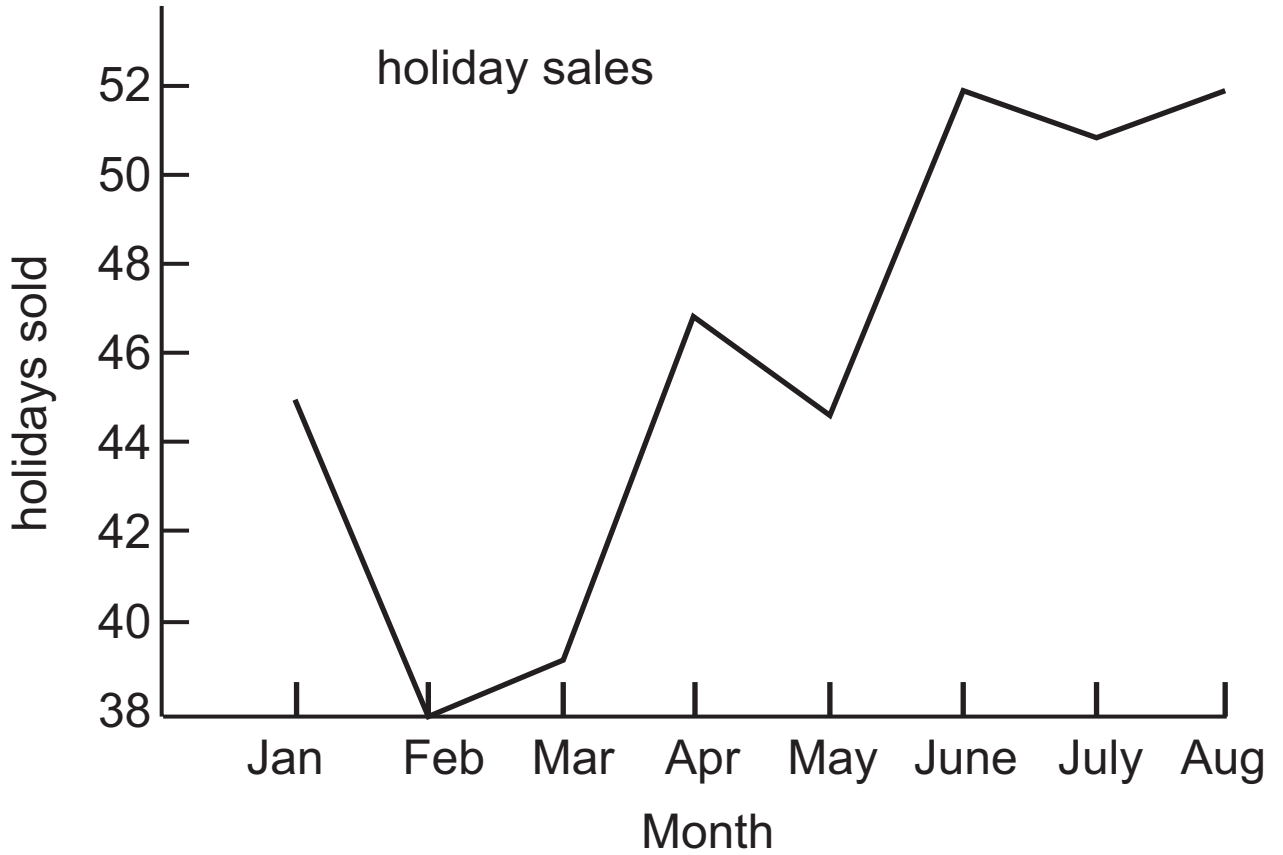
Graph B

(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 _____

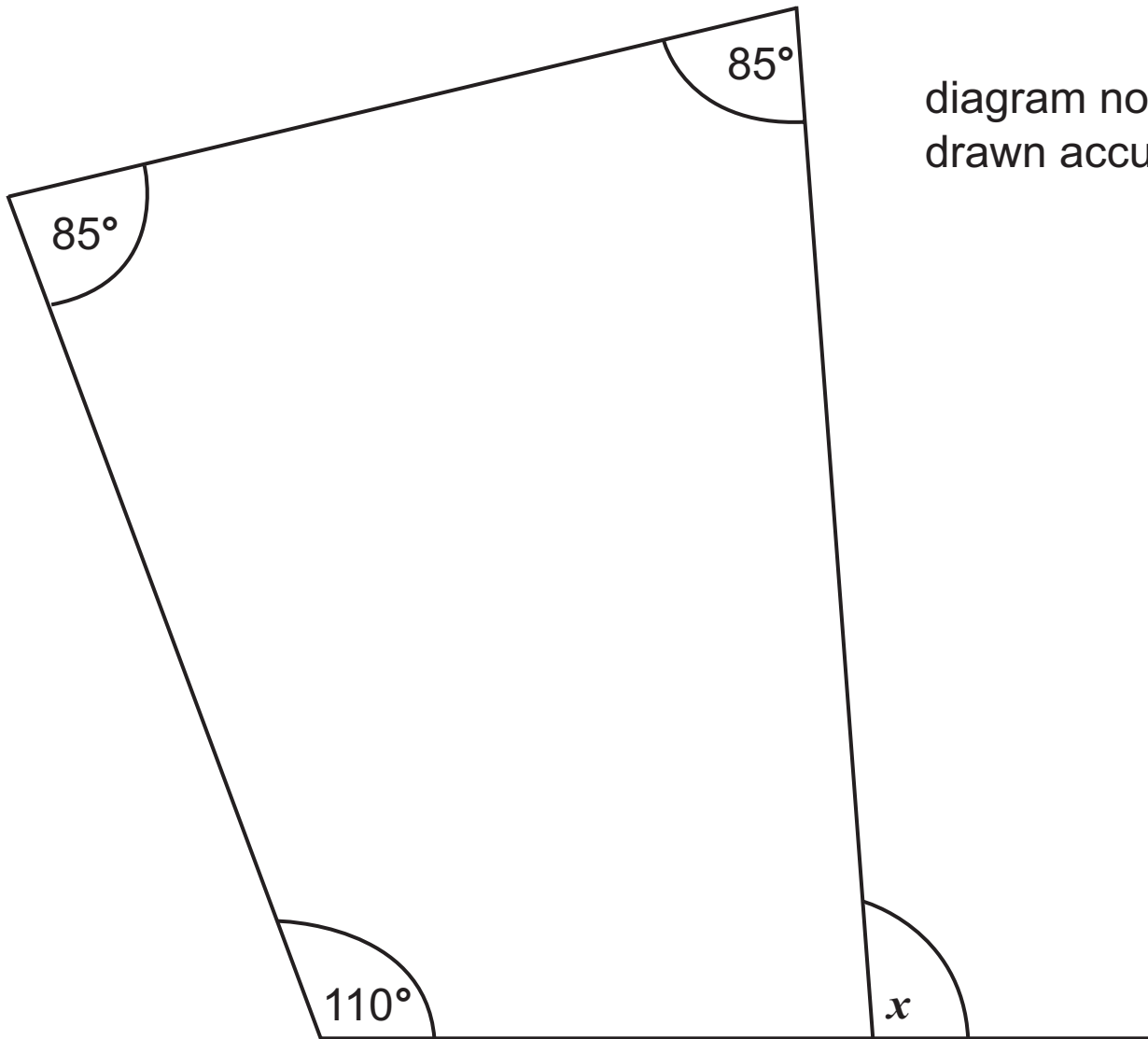**7** Calculate the size of angle x in the diagram below.
[3 marks]

diagram not drawn accurately

85°

85°

110°

x

Answer x = _____ °

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 = _____

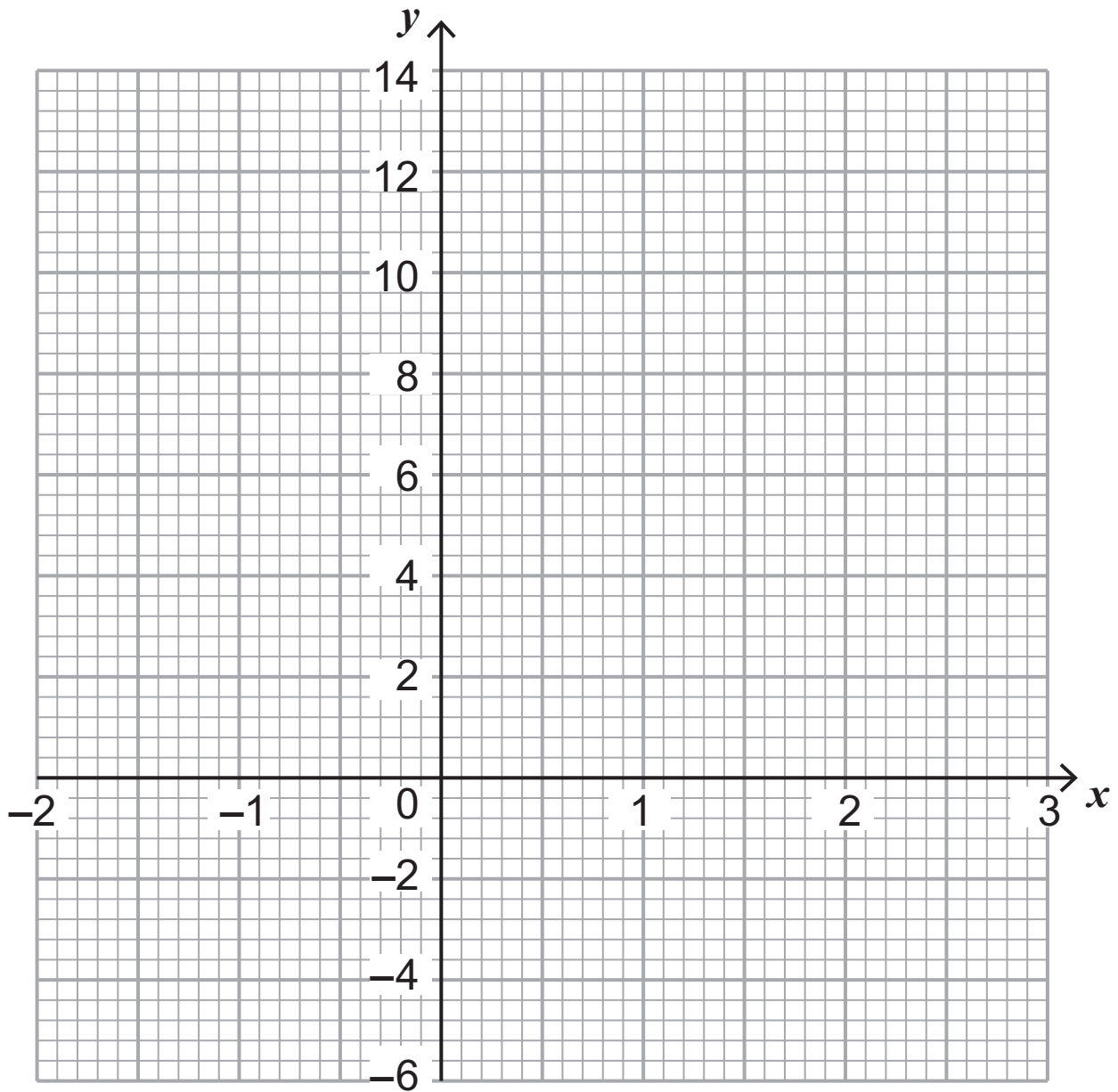**(c)** Solve [1 mark]

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

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 24.6**p** 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 $0.1\dot{0}\dot{3}$ [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 (°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°C). [1 mark]

Answer _____ minutes

(d) Describe the correlation. [1 mark]

Answer _____

A blank graph grid with the x-axis labelled "Time (minutes)" marked at 5, 10, 15, 20, 25, 30, 35, and the y-axis labelled "Temperature (°C)" marked at 10, 20, 30, 40.
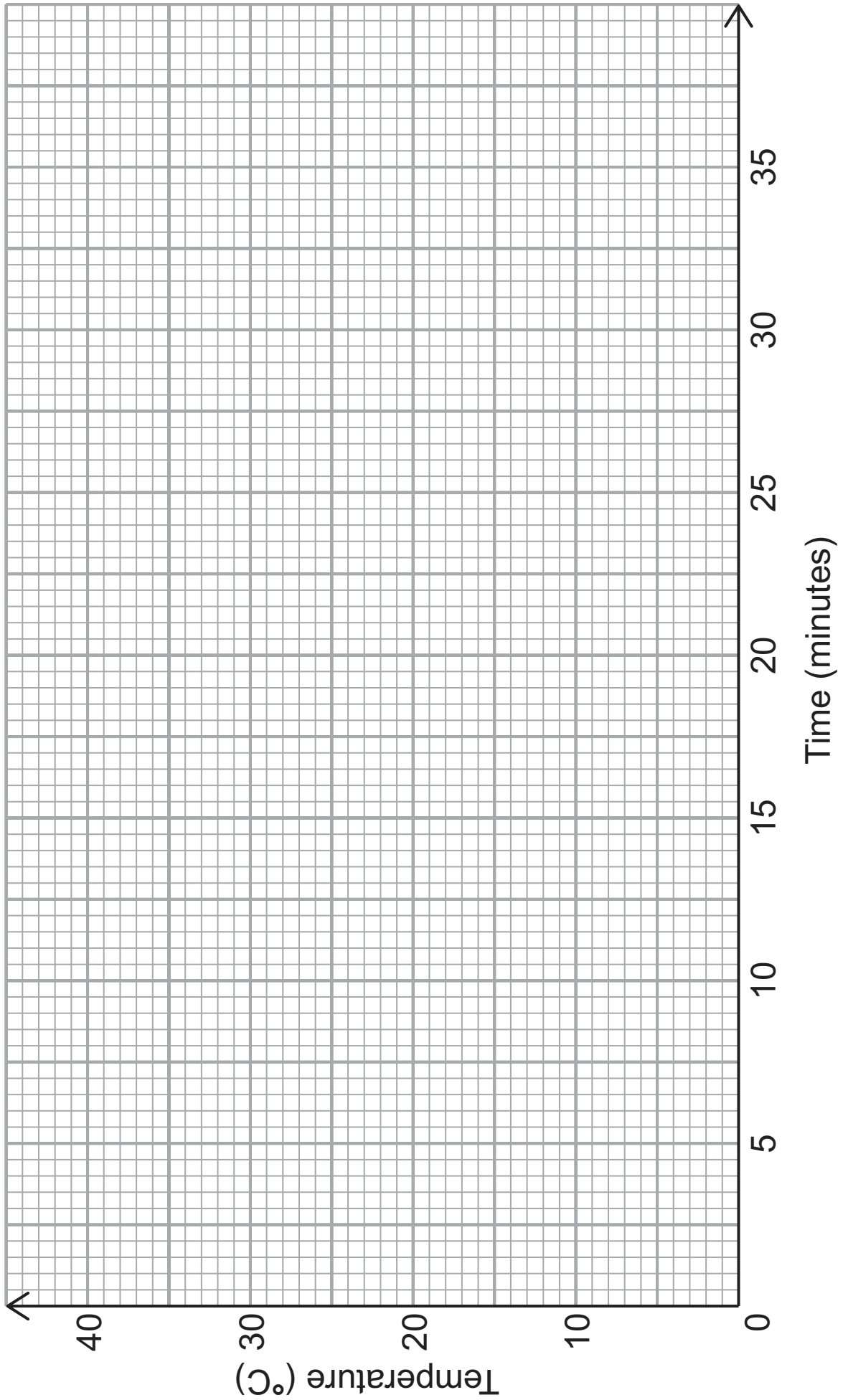
15 Twenty two pupils were asked to record the time
(in minutes) they spent on their homework last
Monday night.
Their responses are listed below.

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

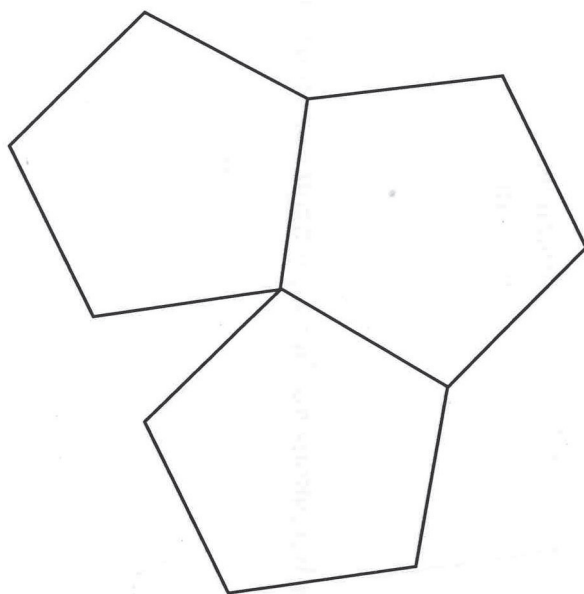Explain why you cannot cover a floor with regular pentagonal tiles. [2 marks]

Answer _____

_____

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 _____ cm²

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 nth 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 _____ %

[Turn over

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

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

Draw a frequency polygon for this data. [3 marks]
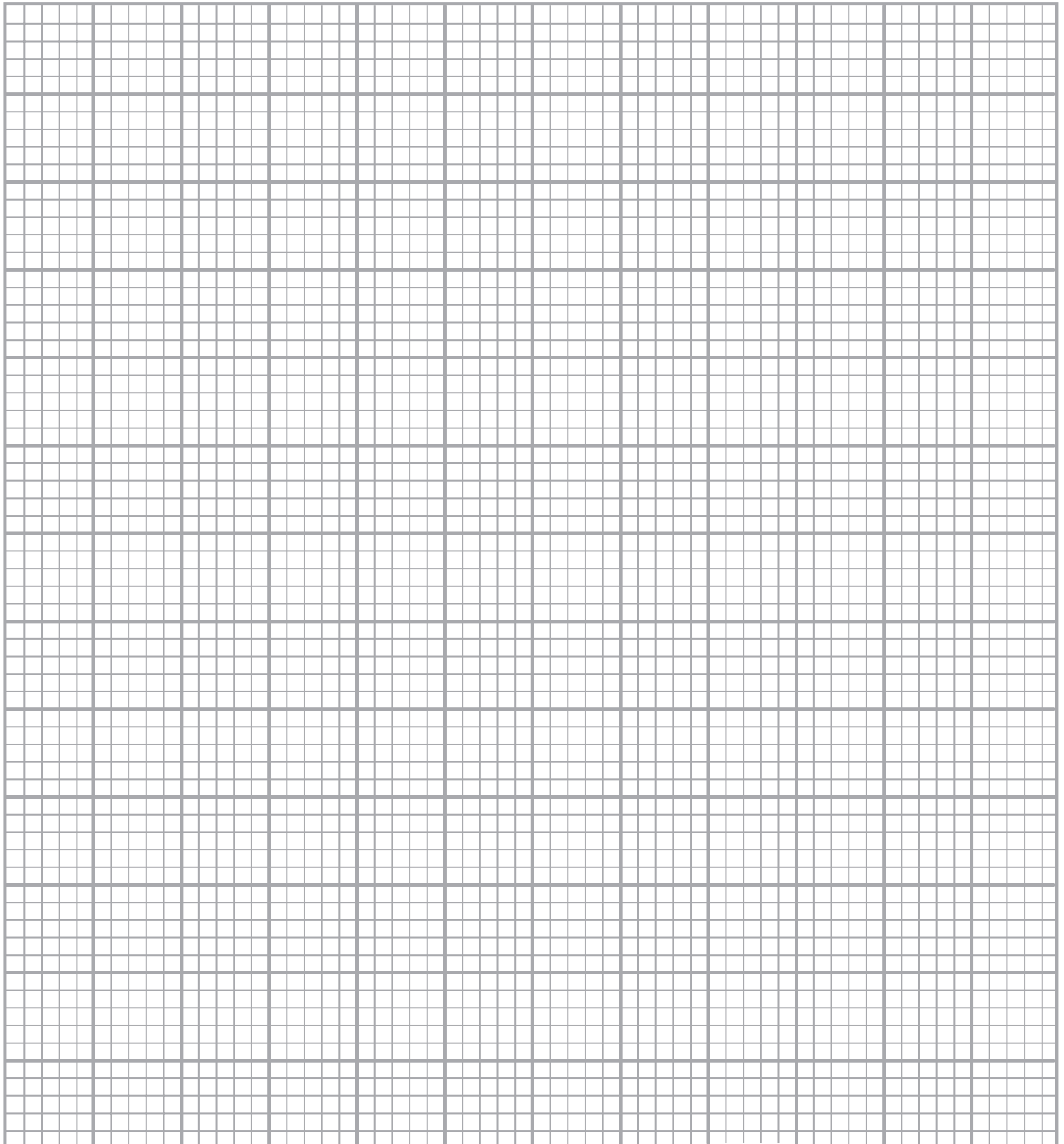
24 A student wishes to carry out a survey relating to television viewing by the general public.
Her first question is

"What age are you?"　　**Answer** ☐

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

_____

(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 nth 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]
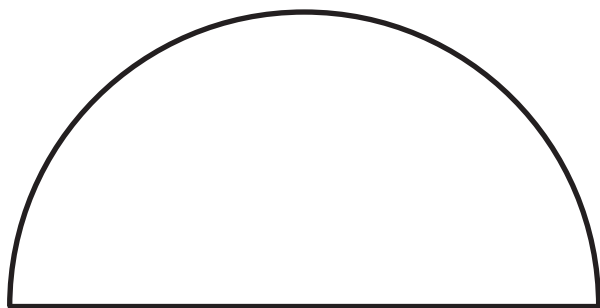
diagram not
drawn accurately

40 cm

Answer _____ cm

27 The sketch shows a field which is in the shape of a right-angled triangle.
The side PQ = 10 m and the side QR = 26 m.

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

Q

diagram not
drawn accurately

26 m

10 m

P

R
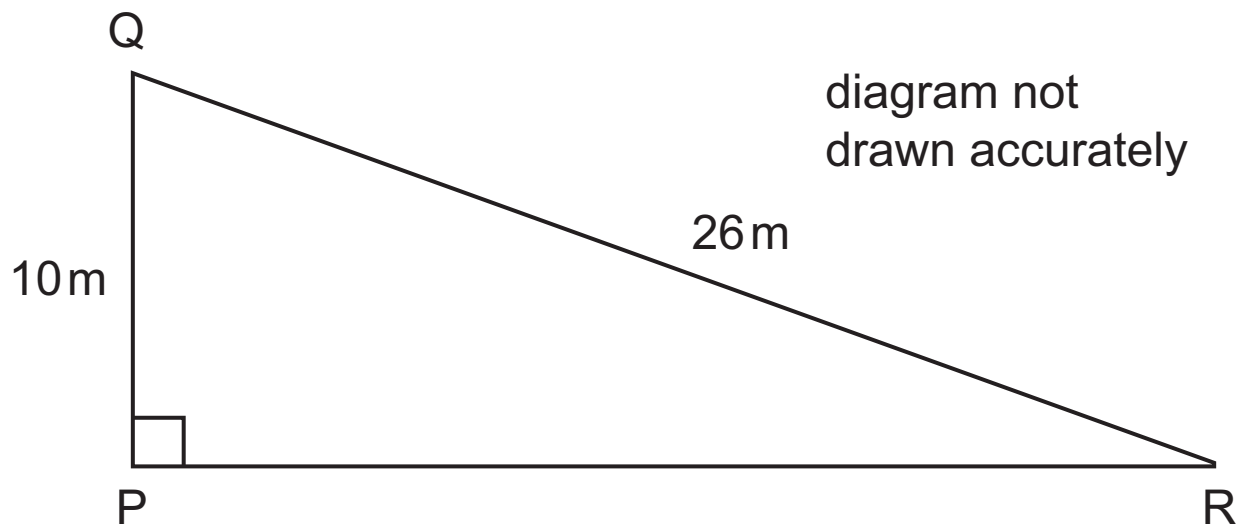
Answer _____ m

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 $x =$ _____

_____

THIS IS THE END OF THE QUESTION PAPER

_____

SOURCES

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
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Total Marks	

Examiner Number

This insert is for use with Question 8.

Dublin Connolly → Bangor timetable (— = does not stop; bold columns are through/Enterprise services)

Dublin Connolly → Belfast Central

Station														
Dublin Connolly [L]				**1000**				**1300**				**1600**		
Newry				**1112**				**1412**				**1712**		
Poyntzpass				—				—				—		
Scarva				—				—				—		
Portadown	0845	0945	1045	**1134**	1145	1245	1345	**1434**	1445	1545	1645	**1734**	1745	1845
Lurgan	0851	0951	1051	**1144**	1151	1251	1351	**1445**	1451	1551	1651	**1745**	1751	1851
Moira	0857	0957	1057	—	1157	1257	1357	—	1457	1557	1657	—	1757	1857
Lisburn	0910	1010	1110	**1203**	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
Derriaghy	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	0934	1034	1134	—	1234	1334	1434	—	1534	1634	1734	—	1834	1934
City Hospital	0937	1037	1137	—	1237	1337	1437	—	1537	1637	1737	—	1837	1937
Botanic	0939	1039	1139	—	1239	1339	1439	—	1539	1639	1739	—	1839	1939
Belfast Central [M]	0942	1042	1142	**1216**	1242	1342	1442	**1507**	1542	1642	1742	**1807**	1842	1942

Belfast Central → Bangor

Station												
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 ✈	0851	0951	1051	1151	1251	1351	1451	1551	1651	1751	1851	1951
Holywood	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

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