Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2014

Mathematics

Unit T2
(With calculator)
Foundation Tier

[GMT21]

GMT21

FRIDAY 10 JANUARY, 9.15 am–10.45 am

TIME

1 hour 30 minutes.

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. Do not write outside the box, around each page, on blank pages or tracing paper.
Complete in blue or black ink only. **Do not write with a gel pen**.
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 down the right-hand side of pages 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 2.

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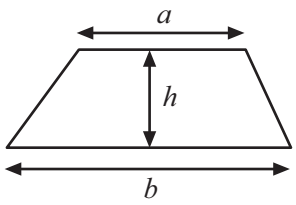
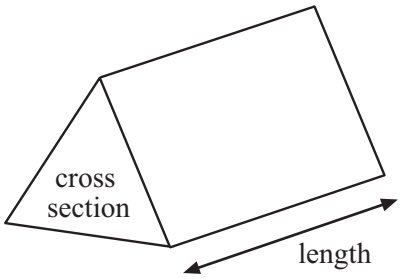
Formula Sheet

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



Volume of prism = area of cross section × length



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Quality of written communication will be assessed in this question.

Examiner Only	
Marks	Remark

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

Answer _____ [2]

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

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

Show clearly how you reach your answer.

Answer _____ [2]

Total Question 1

[Turn over

Examiner Only	
Marks	Remark

2 **(a)** From the numbers in the list below

24 56 81 40 25 66 59 90 27

(i) write down a square number,

Answer _____ [1]

(ii) write down a cube number.

Answer _____ [1]

(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?

Answer _____ [2]

Total Question 2

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?

Show clearly how you worked out your answer.

Answer £ _____ [4]

Total Question 3

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?

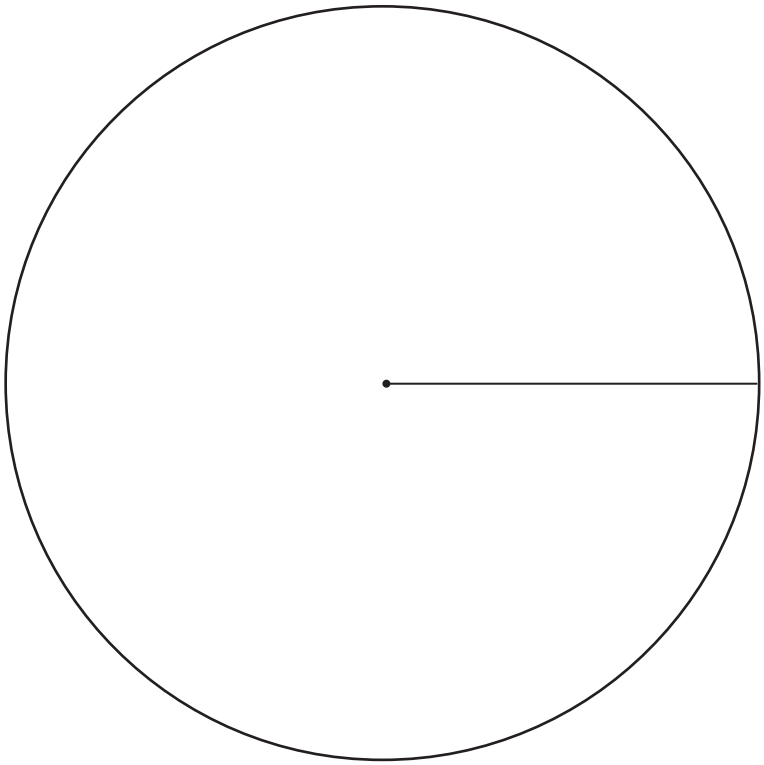
Answer _____ cm [3]

Examiner Only	
Marks	Remark
Total Question 4	

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.



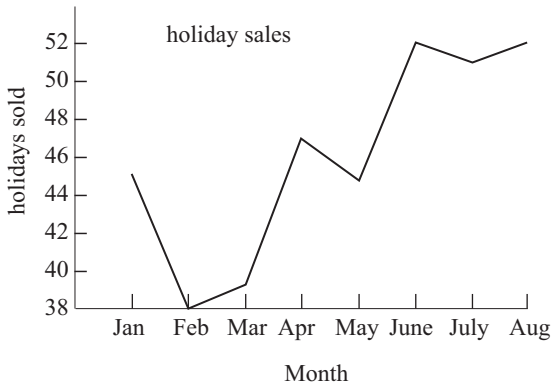
[4]

Total Question 5

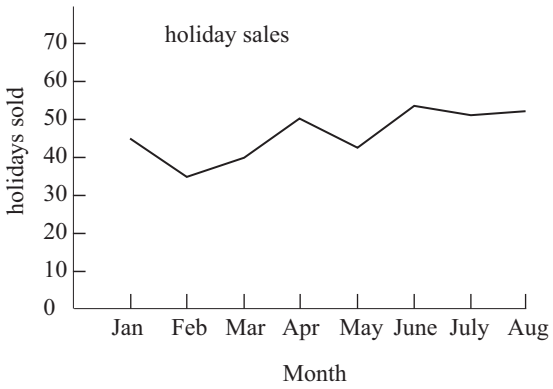
6 The two graphs below show similar information but look different.

Examiner Only	
Marks	Remark

Graph A



Graph B



(a) Which graph appears to show the biggest increase in sales?

Answer Graph _____ [1]

(b) What causes this graph to be misleading?

Answer _____ [1]

Total Question 6	

7 Calculate the size of angle x in the diagram below.

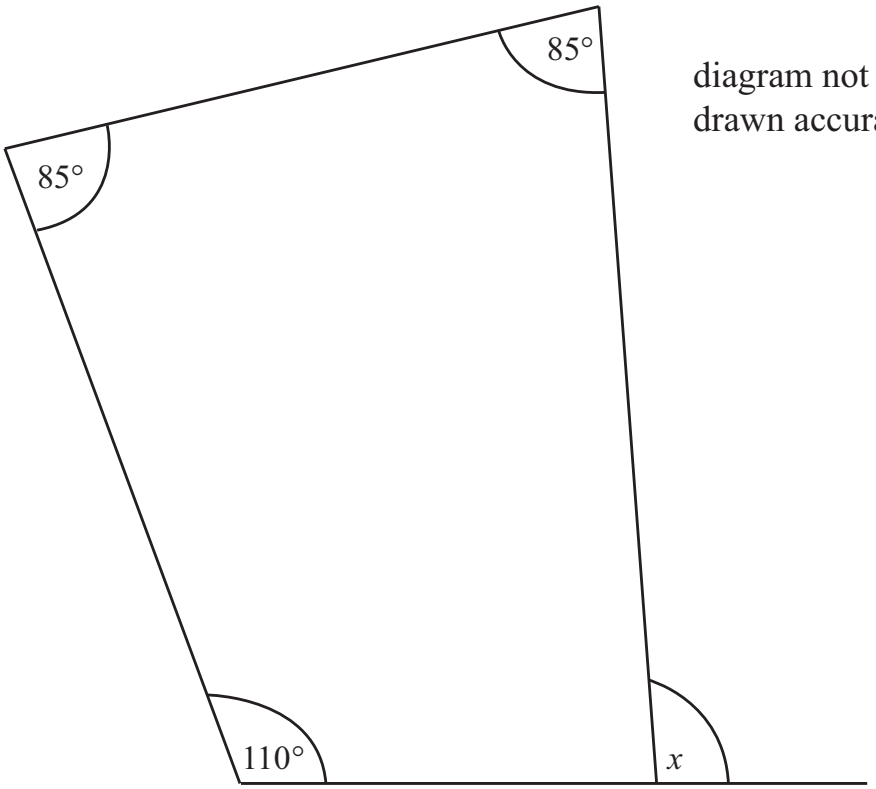


diagram not drawn accurately

Answer $x =$ _____° [3]

Examiner Only	
Marks	Remark
Total Question 7	

[Turn over

8

Dublin Connolly				*1000*				*1300*				*1600*			
Newry (L)				*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	|	1451	1551	1651	|	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	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 (M)	0842	0942	1042	1142	*1216*	1242	1342	1442	*1507*	1542	1642	1742	*1807*	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 ✈	0851	0951	1051	1151		1251	1351	1451		1551	1651	1751		1851	1948
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

(a) Sarah takes the 1134 train from Portadown to Belfast Central.
How long should the journey take?

Answer _____ minutes [1]

Examiner Only	
Marks	Remark

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

Answer _____ [1]

(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?

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 8	

9 A rectangle measures 7.6 cm by 4.8 cm.

Calculate

(a) the area of this rectangle,

Answer _____ [3]

(b) the perimeter of this rectangle.

Answer _____ cm [1]

Examiner Only	
Marks	Remark
Total Question 9	

10 **(a)** Simplify

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

Answer _____ [2]

(b) Solve

$7x - 3 = 18$

Answer x = _____ [2]

(c) Solve

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

Answer x = _____ [1]

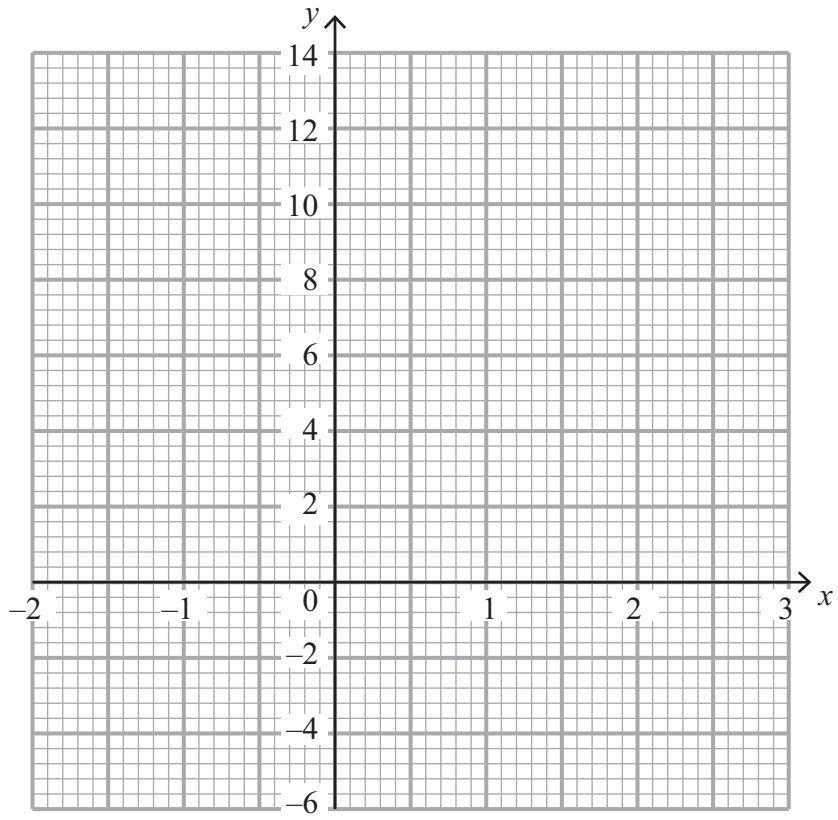
Examiner Only	
Marks	Remark
Total Question 10	

11 **(a)** Complete the table of values for the equation $y = 3x + 5$

x	–2	–1	0	1	2	3
y	–1		5	8		14

[1]

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



[2]

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

Examiner Only	
Marks	Remark
Total Question 11	

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?

Show clearly how you arrived at your answer.

Answer £ _____ [5]

Examiner Only	
Marks	Remark
Total Question 12	

13 **(a)** Write down two numbers which are square roots of 49

Answer _____ and _____ [1]

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

Answer _____ [1]

Total Question 13	

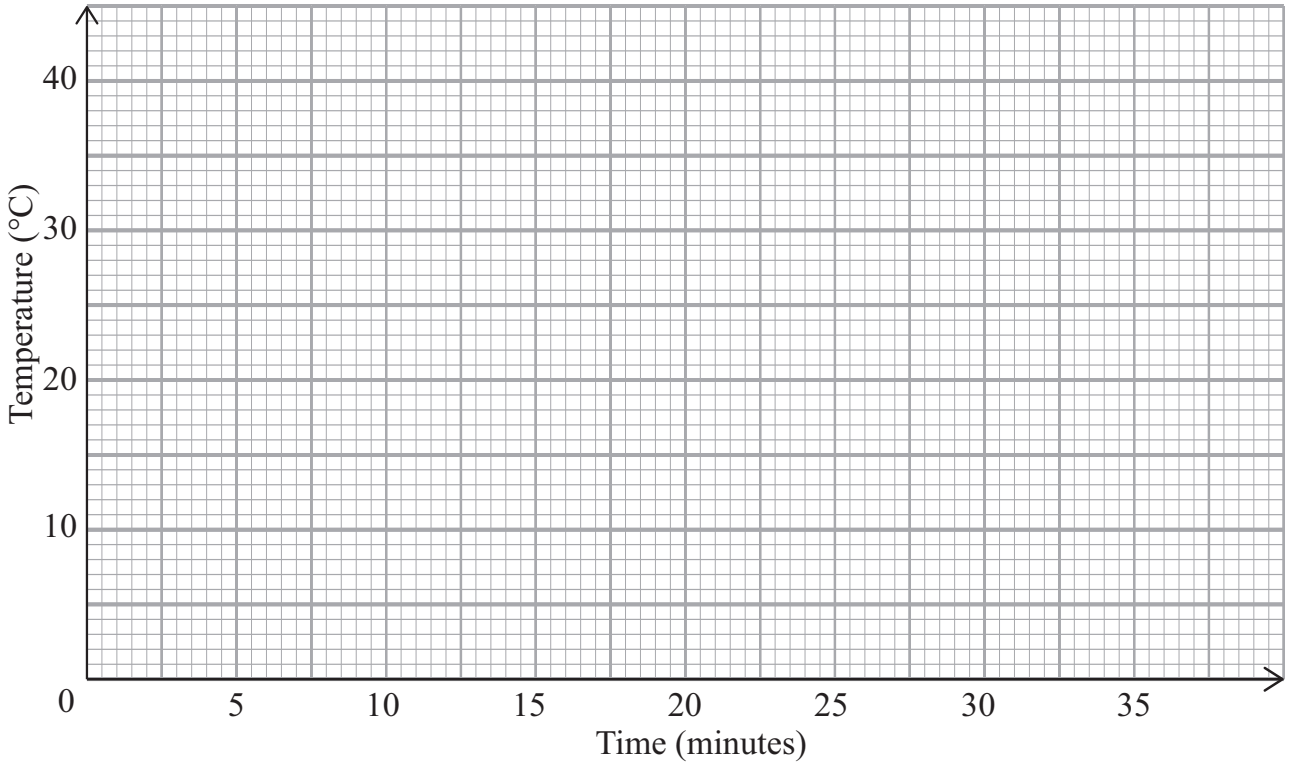
[Turn over

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

Examiner Only	
Marks	Remark

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. [2]



Examiner Only	
Marks	Remark

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

(c) Estimate the time taken for a liquid to reach freezing point (0 °C).

Answer _____ minutes [1]

(d) Describe the correlation.

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 14	

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]

Total Question 15

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

Examiner Only	
Marks	Remark

16 (a) Calculate the size of the interior angle of a regular pentagon.

Answer _____ ° [2]

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

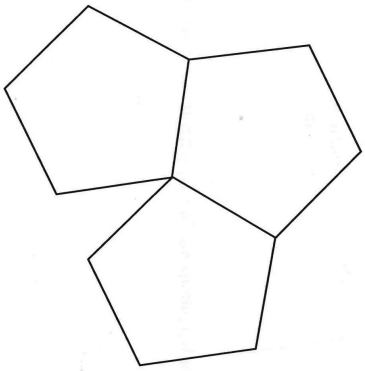


diagram not
drawn accurately

Explain why you cannot cover a floor with regular pentagonal tiles.

Answer _____

_____ [2]

Total Question 16

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

Examiner Only	
Marks	Remark

(a) Calculate the area of the base of the oil tank.

Answer _____ cm^2 [2]

The height of the oil tank is 70 cm.

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

Answer _____ litres [3]

Total Question 17	

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.

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 18	

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

(a) Write down the first 3 terms of this sequence.

Answer _____, _____, _____ [2]

(b) Explain why 101 cannot be a term in this sequence.

Answer _____ [1]

Total Question 19

20 Solve $7e + 3 = 4e + 5$

Answer e = _____ [3]

Total Question 20

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

Answer _____ [3]

(b) Find the Lowest Common Multiple (LCM) of 63 and 84

Answer _____ [2]

Examiner Only	
Marks	Remark

Total Question 21

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

What is the percentage increase in the weight of the cow?

Answer _____ % [3]

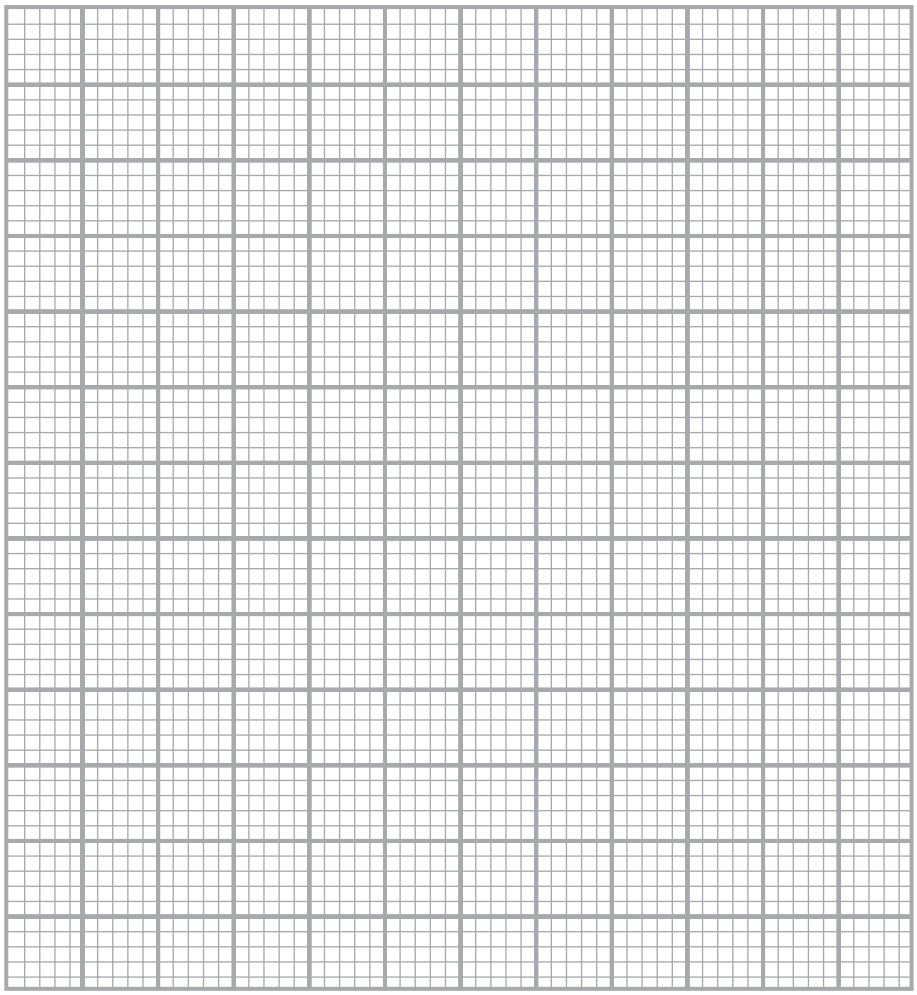
Total Question 22

[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]

Examiner Only	
Marks	Remark
Total Question 23	

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]

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

[2]

Examiner Only	
Marks	Remark
Total Question 24	

25 The first five terms of a sequence are 9, 13, 17, 21, 25
Find an expression, in terms of n, for the n^{th} term of this sequence.

Answer _____ [2]

Total Question 25

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

Calculate the perimeter of the semi-circle.

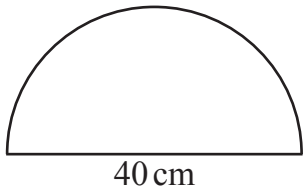


diagram not drawn accurately

Answer _____ cm [3]

Examiner Only	
Marks	Remark
Total Question 26	

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.

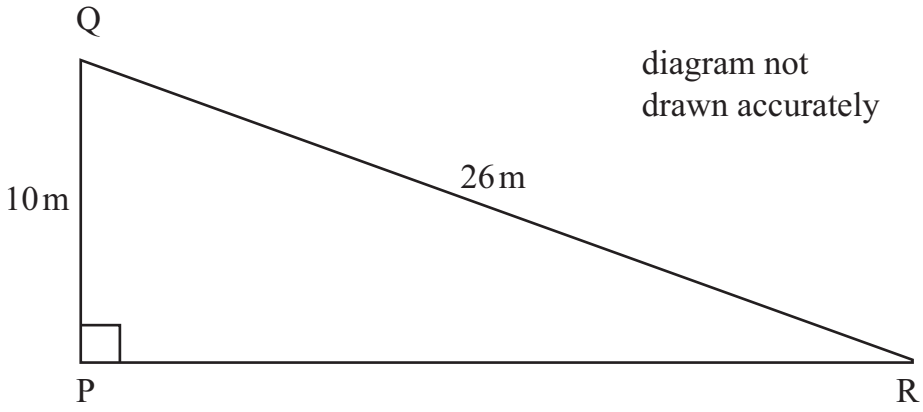


diagram not drawn accurately

Answer _____ m [3]

Total Question 27	

28 Expand and simplify $3(2w - 1) - 2(w - 4)$

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 28	

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.
Show all your working.

Answer x = _____ [4]

Examiner Only	
Total Question 29	

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	**Marks**
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Examiner Number