Surname	Centre Number	Candidate Number
Other Names		0

GCSE

C300U10-1

S18-C300U10-1

MATHEMATICS – Component 1
Non-Calculator Mathematics
FOUNDATION TIER

THURSDAY, 24 MAY 2018

– MORNING

2 hours 15 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**3**	
3.	**5**	
4.	**6**	
5.	**4**	
6.	**5**	
7.	**4**	
8.	**1**	
9.	**4**	
10.	**4**	
11.	**4**	
12.	**4**	
13.	**8**	
14.	**11**	
15.	**5**	
16.	**3**	
17.	**4**	
18.	**3**	
19.	**2**	
20.	**2**	
21.	**1**	
22.	**2**	
23.	**4**	
24.	**3**	
25.	**9**	
26.	**4**	
27.	**4**	
28.	**3**	
29.	**1**	
Total	**120**	

C300U101
01

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.

A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

Curved surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

Examiner only

1. *(a)* Work out (12 + 9) ÷ 3. [1]

.....

.....

(b) Write 1% as

(i) a fraction, [1]

.....

.....

(ii) a decimal. [1]

.....

.....

(c) Work out 5% of 32. [2]

.....

.....

.....

(d) Write these values in order. Start with the smallest. [1]

$\frac{3}{5}$ $\frac{3}{10}$ $\frac{3}{7}$

.....

.....

.....

(e) Work out 100 × 1·098. [1]

.....

.....

Examiner only

2. *(a)* A 3D shape has

- 12 edges
- 4 rectangular faces and
- 2 square faces.

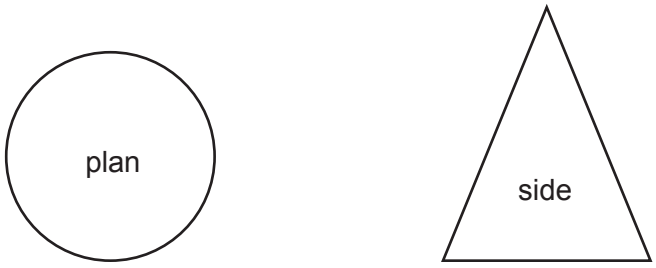
(i) What is the name of this 3D shape? [1]

.....

(ii) How many vertices does the 3D shape have? [1]

.....

(b) The diagram shows the plan and side elevation of another 3D shape.

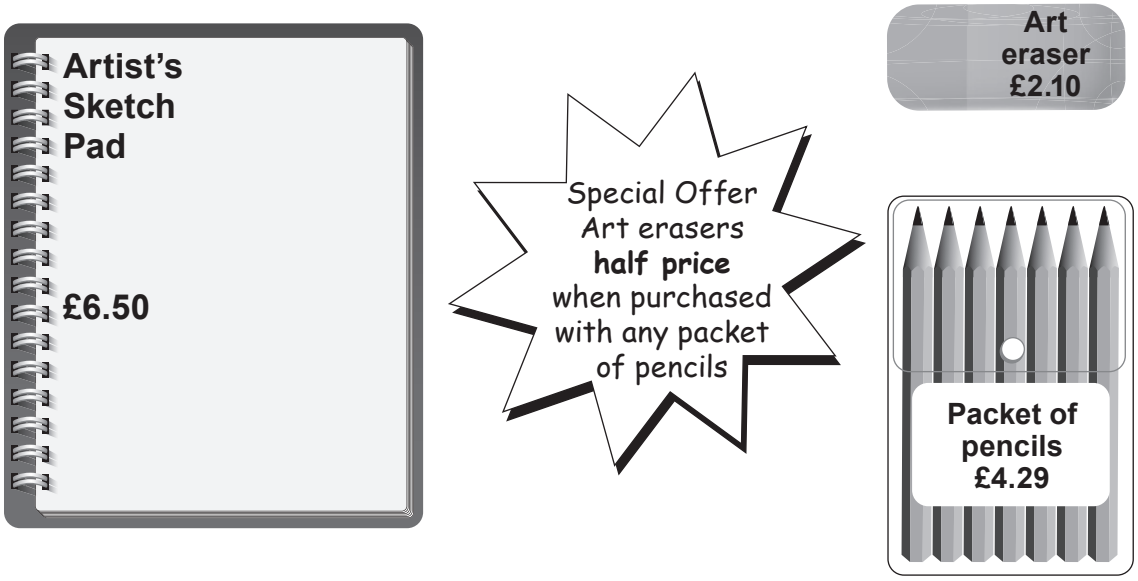


Circle a correct name for the 3D shape shown. [1]

cylinder | triangular prism | pyramid | cone | sphere

Examiner only

3. Georgia has exactly £20 in her purse and goes shopping for art supplies.
She buys a sketch pad, a packet of pencils and an eraser, as shown below.



(a) How much does Georgia pay for her art supplies? [3]

.....

.....

.....

.....

.....

(b) Georgia then goes to a different shop and buys paint costing £2.75.

How much money does Georgia have left in her purse after she buys the paint? [2]

.....

.....

.....

.....

Georgia has ..... left.

C300U101
05

Examiner only

4. The timetable shows some train times from Newport to Barry Island.

Newport (South Wales) dep.	10:00		10:32		10:40		11:01		11:32		12:00	
Cardiff Central arr.	10:18	C	10:46	C	10:56	C	11:15	C	11:46	C	12:18	C
Cardiff Central dep.		10:25		10:55		11:10		11:25		11:55		12:25
Barry Island arr.		10:55		11:25		11:40		11:55		12:25		12:55

Key: C Change train.

(a) Ade wants to arrive in Barry Island by 12 noon.

What is the time of the latest train he can take from Newport? [1]

.....

.....

(b) Sanjeet takes the 10:32 train from Newport.

How long does it take Sanjeet to get from Newport to Barry Island? [2]

.....

.....

.....

.....

.....

.....

..... minutes.

Examiner only

(c) (i) Sanjeet is choosing what to take for lunch.
He chooses from the following options.

Sandwich (S) or Pasty (P) and Apple (A) or Banana (B) and Tea (T) or Coffee (C)

Complete the table to show all the different choices that Sanjeet has.
The first two have been completed for you.
You may not need all the lines in the table. [2]

S	A	T
S	A	C

(ii) Sanjeet is equally likely to choose any of the possible options.

What is the probability that he chooses a sandwich, a piece of fruit and a coffee? [1]

.....

.....

.....

Examiner only

5. The cost, in £, of hiring fitness equipment is given by the formula:

cost of hire = number of days hired × 5 + 25

(a) Jen hires some fitness equipment for 9 days.

How much does Jen pay? [2]

.....

.....

.....

.....

.....

Jen pays £ .....

(b) Peter pays £225 to hire some fitness equipment.

For how many days does Peter hire this equipment? [2]

.....

.....

.....

.....

.....

.....

..... days

Examiner only

6. *(a)* Ben wants to buy a football shirt with his name and a number on it.
He wants the best price he can get.

Here are his choices.

Should he buy his shirt from ***Shot On Goal*** or ***Shirts Glorious Shirts***?
Show how you decide. [3]

.....

.....

.....

.....

.....

.....

.....

.....

(b) Ben buys a season ticket to watch his team.
The ticket costs £276.
Ben chooses to pay for his season ticket in 12 monthly instalments at no extra cost.

How much does Ben pay for his season ticket each month? [2]

.....

.....

.....

.....

Ben pays £ ..... each month.

C300U101
09

Examiner only

7. A model of a house is made using the scale 1 : 50.

(a) A window on the model is 4 cm high.

What is the height of the window on the actual house? [1]

.....

.....

.....

(b) Chris makes a door on the model 3 cm wide.
The door of the actual house is 75 cm wide.

Has Chris made the door the correct width?
Show how you decide. [1]

.....

.....

.....

(c) A wall in the actual house is 2 metres 50 centimetres high.

How high should this wall be in the model house?
Give your answer in centimetres. [2]

.....

.....

.....

8. One button is chosen at random from a bag of buttons.
The probability that it is yellow is 0·2.

What is the probability that the button chosen is **not** yellow? [1]

.....

.....

.....

Examiner only

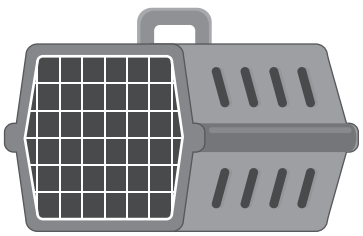
9. *(a)* Write down a percentage that lies between $\frac{1}{3}$ and $\frac{2}{5}$. [1]

(b) Work out $\frac{1}{4}$ of $\left(\frac{2}{3} \text{ of } 48\right)$. [3]

10. Donna wants to take 3 guinea pigs and 2 rabbits to the vet.

To be safe, Donna's pet carrier must not carry pets with a total mass greater than 7 kilograms.

Max. safe load 7 kg



Donna weighs one guinea pig and overestimates the total mass of her 3 guinea pigs to be 3000 grams.

She weighs her rabbits and writes her results in this table.

Snowy	Sooty
1986 grams	1834 grams

- Write down a calculation to **estimate** the **total** mass of Donna's **rabbits**.
- Using the information in the question, decide whether Donna can safely take all her pets to the vet in her pet carrier.
  Show how you decided. [4]

Examiner only

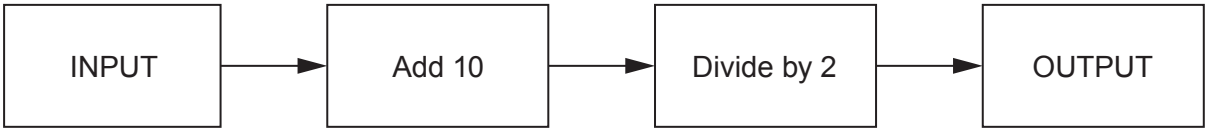
11. A mathematics teacher sets a puzzle for her class.
She says:

'In my purse I have 2^3 coins.
The value of the coins in my purse is £$(3^2 + 1^3)$.
The coin with the greatest value is worth 4 times the coin with the smallest value.
What coins could I have in my purse?'

Solve the teacher's puzzle. [4]

Examiner only

12. *(a)* Here is a number machine.



(i) The input is 100.
What is the output? [1]

.....

.....

(ii) The input is –12.
What is the output? [1]

.....

.....

(iii) The output is 6·5.
What is the input? [1]

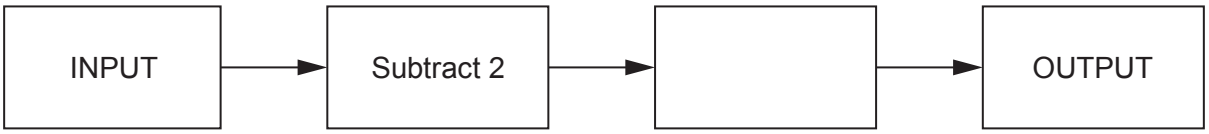
.....

.....

(b) The table shows some input and matching output values for a different number machine.
The number machine is given below.

Input	Output
18	4
51	7

Complete the number machine. [1]

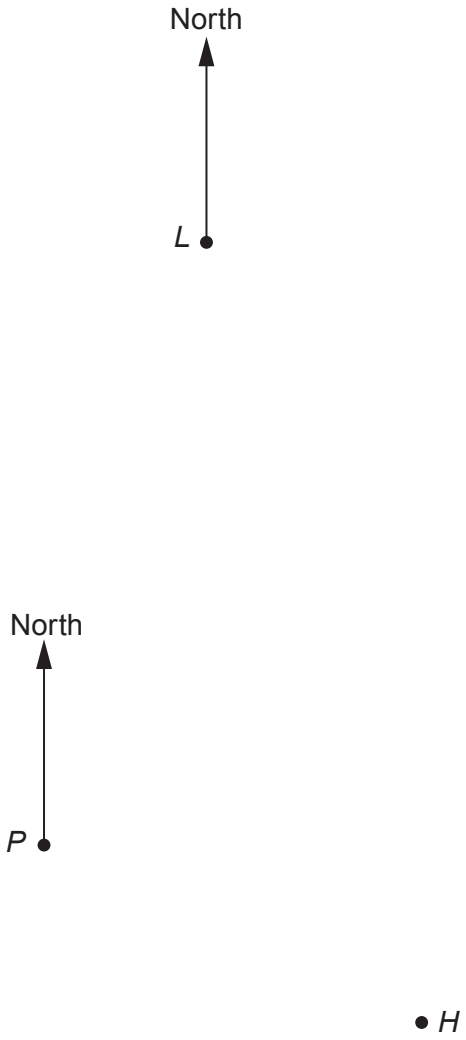


Examiner only

13. *(a)* The scale drawing shows the positions of a lighthouse (*L*), a port (*P*) and a harbour (*H*).

A boat (*B*) is at sea on a bearing of 135° from the lighthouse (*L*) and 064° from the port (*P*).

Mark the position of the boat on the drawing. [3]



Scale: 1 cm represents 10 km

Examiner only

(b) (i) In normal conditions, the boat uses 1 litre of fuel to travel 5 km.

Work out how many litres of fuel the boat will use to get to the harbour (*H*).
The scale is 1 cm represents 10 km. [3]

.....

.....

.....

.....

.....

.....

.....

(ii) State any assumption you have made in answering part *(b)*(i).
How would your answer to part *(b)*(i) change if you did not make this assumption? [2]

.....

.....

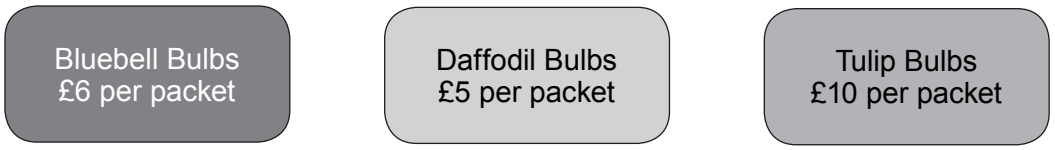
.....

.....

.....

Examiner only

14. *(a)* A garden centre sells packets of flower bulbs.



One day, the garden centre sells:

- x packets of bluebell bulbs
- twice as many packets of daffodil bulbs as bluebell bulbs
- five times as many packets of tulip bulbs as bluebell bulbs.

In total, 320 packets of bulbs are sold.

How much money does the garden centre take from selling these bulbs? [5]

The garden centre takes £ .....

Examiner only

(b) Anna and Tom work part-time at the garden centre.
The number of hours they each work is in the ratio 3 : 5.
Tom works for 25 hours each week.

(i) Work out the **total** number of hours Anna and Tom work each week. [2]

.....

.....

.....

.....

.....

.....

(ii) Anna earns £156 each week.

How much does Anna earn per hour? [2]

.....

.....

.....

.....

(iii) Tom gets a pay **increase** of £1 per hour.
His hours remain the same and he now earns £175 per week.

How much did Tom earn per hour **before** his pay increase? [2]

.....

.....

.....

.....

Examiner only

15. *(a)* One day, $\frac{5}{7}$ of the pupils in Year 10 at *North High School* went on a school trip.

There were 46 pupils in Year 10 who did not go on the trip.

How many pupils are there in Year 10 at *North High School*? [2]

(b) Alex and Mary go to *North High School.*

Alex walks $\frac{5}{8}$ of a mile to school. His friend Mary walks $\frac{7}{10}$ of a mile to school.
Mary says,

'I walk exactly $\frac{3}{40}$ of a mile more than Alex does to school.'

Is Mary correct?
Show calculations to support your decision. [3]

Examiner only

16. Sara inherits £1700.
She invests the money in an account paying 3% per year **simple interest**.

She plans to use the money from the account to go back-packing in 4 years' time and estimates that she will need £2000.

Will Sara be able to afford to go back-packing if she only uses the money from the account?
Show how you decide. [3]

.....

.....

.....

.....

.....

.....

.....

.....

Examiner only

17. In the diagram, *ABC* is a triangle.
BC is parallel to *DEF*.
AEB and *AFC* are straight lines.

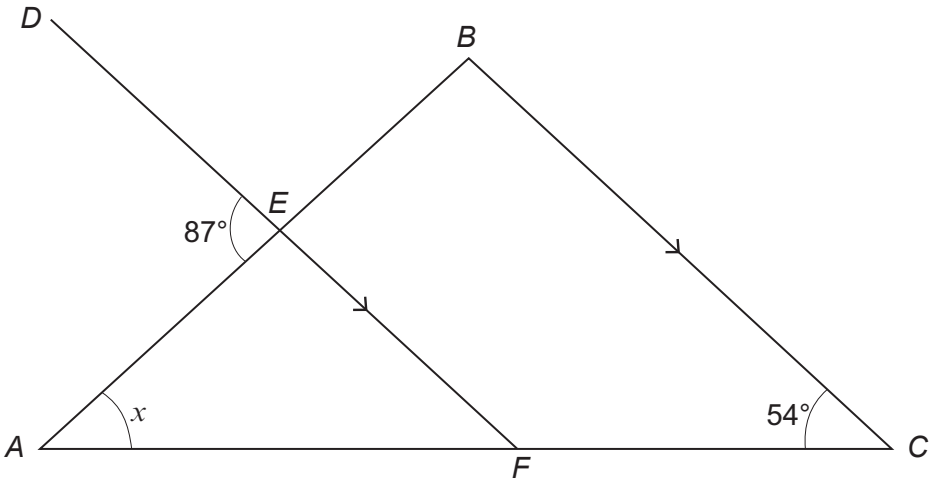


Diagram not drawn to scale

Show that x = 33°.
You must give a reason for each step of your working. [4]

Examiner only

18. The diagram shows a triangle, *PQR*, with height *PS*.

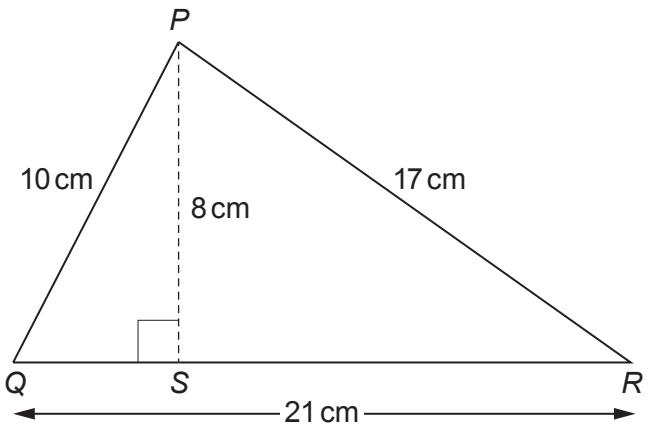


Diagram not drawn to scale

(a) Work out the area of triangle *PQR*. [2]

.....

.....

.....

(b) *PS* is the shortest possible distance from *P* to *QR*.
Explain why this is correct. [1]

.....

.....

Examiner only

19. Two squares are always similar.

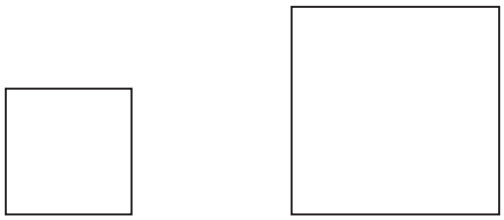


Diagram not drawn to scale

The **areas** of two squares are in the ratio 4 : 9.

(a) Complete this statement with a fraction. [1]

The area of the smaller square is ..... of the area of the larger square.

(b) Write down a possible length for
- the side of the smaller square,
- the side of the larger square.

Give your answer as a ratio. [1]

.....

side of smaller square : side of larger square is ..... : .....

Examiner only

20. Here is an identity in terms of the variable x.

$$m(x + 2) \equiv 3x + n$$

Write down the value of each of the constants m and n. [2]

.....

.....

.....

.....

m = ... n = ...

21. Circle the correct value of tan 45°. [1]

0 $\frac{\sqrt{3}}{3}$ $\frac{\sqrt{2}}{2}$ 1 $\sqrt{3}$

22. Jamil is taking a group of students on a camping trip.

He buys tins of soup and bottles of water.
He needs to buy the same number of tins as bottles.
Tins of soup are sold in packs of 12 and bottles of water are sold in packs of 15.

What is the smallest number of packs of each that Jamil can buy? [2]

.....

.....

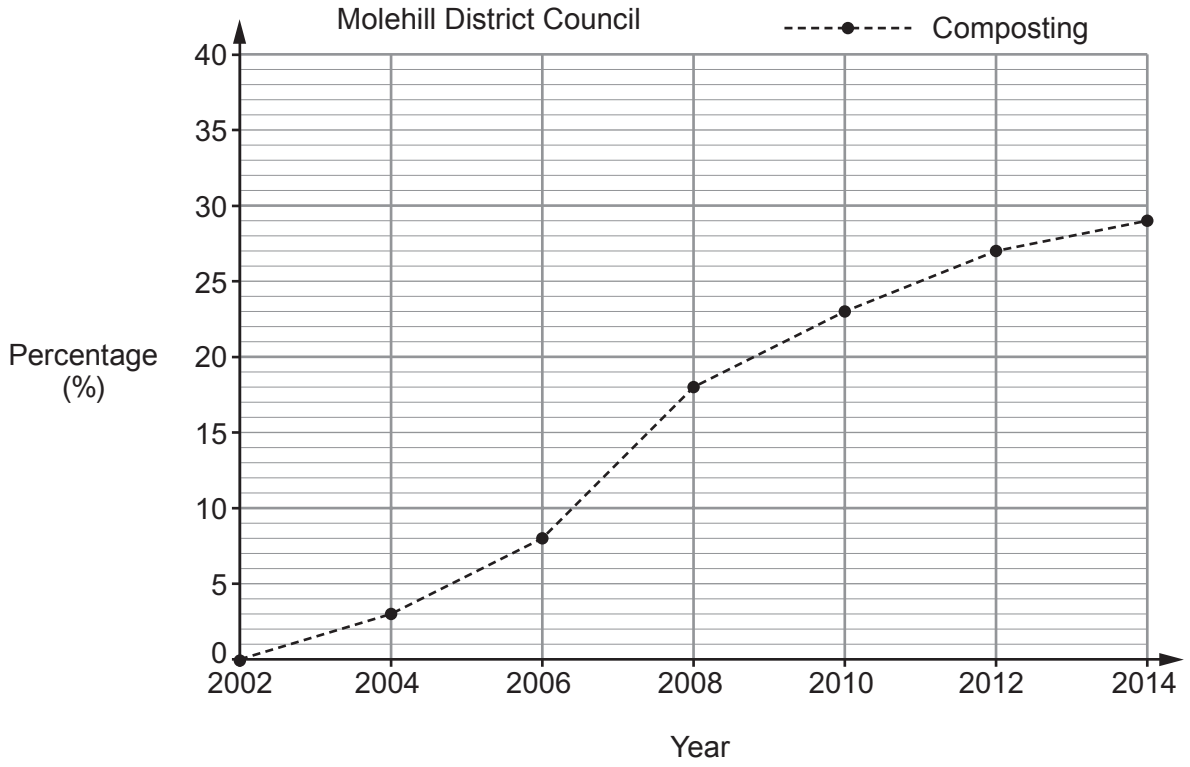
.....

.....

Number of **packs** of soup ..... Number of **packs** of water .....

Examiner only

23. The graph shows information about the percentage of waste **composted** by Molehill District Council from 2002 to 2014.



The table shows information about the percentage of waste **recycled** by Molehill District Council from 2002 to 2014.

Year	2002	2004	2006	2008	2010	2012	2014
Recycling (%)	15	18	32	36	32	30	27

(a) On the grid above, plot the data for recycling. [1]

(b) (i) The mayor of Molehill says,

'One year, the percentage of waste recycled was 6 times the percentage of waste composted.'

Write down the year for which this comment is correct. [1]

.....

(ii) Between which two years did the percentage of waste composted increase the most? [1]

Between ..... and .....

(iii) Using the information provided, write one comment, **comparing** how the percentages of waste recycled **and** composted have changed between 2002 and 2014. [1]

.....

.....

.....

Examiner only

24. *(a)* One Saturday, Alfie records the amount of money each customer spends in a charity shop.
He presents his data in a grouped frequency table, as shown below.

Money spent (£)	Frequency
0 to 20	62
20 to 40	8
40 and over	1

State one criticism of the way Alfie has presented his data. [1]

.....

.....

(b) The charity has a Fun Day to raise money.

Alfie is in charge of a game of chance.

- A fair spinner is marked with the numbers 1 to 10.
- A player spins once and wins £2 if the spinner lands on 6.

Liam plays the game exactly twice.
Work out the probability that Liam wins £4. [2]

.....

.....

.....

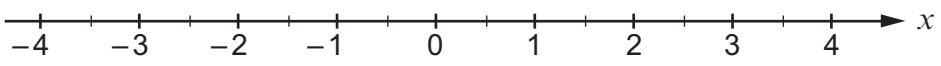
Examiner only

25. *(a)* Solve $12x - 9 = 6 + 7x$. [2]

(b) Solve $10(x + 2) - (2x - 9) = 30$. [3]

(c) (i) Solve the inequality $10x - 7 \leqslant 8$. [2]

(ii) Represent your answer to part *(c)*(i) on the number line below. [1]



Examiner only

(d) Gracie is trying to solve the equation $x^2 - 5x + 6 = 0$.

Here is her work.

$x^2 - 5x + 6 = 0$
$(x - 3)(x - 2) = 0$
$x - 3 \quad x - 2$
$x = -3, \quad x = -2$

Is Gracie's work correct?

Yes ☐ No ☐

Show clearly how you decide. [1]

.....

.....

.....

26. *(a)* Find an expression for the nth term of this sequence. [2]

3 11 19 27 35

.....

.....

.....

.....

.....

(b) The nth term of a different sequence is $2n^3 + 3$.
Write down the first 3 terms of this sequence. [2]

.....

.....

.....

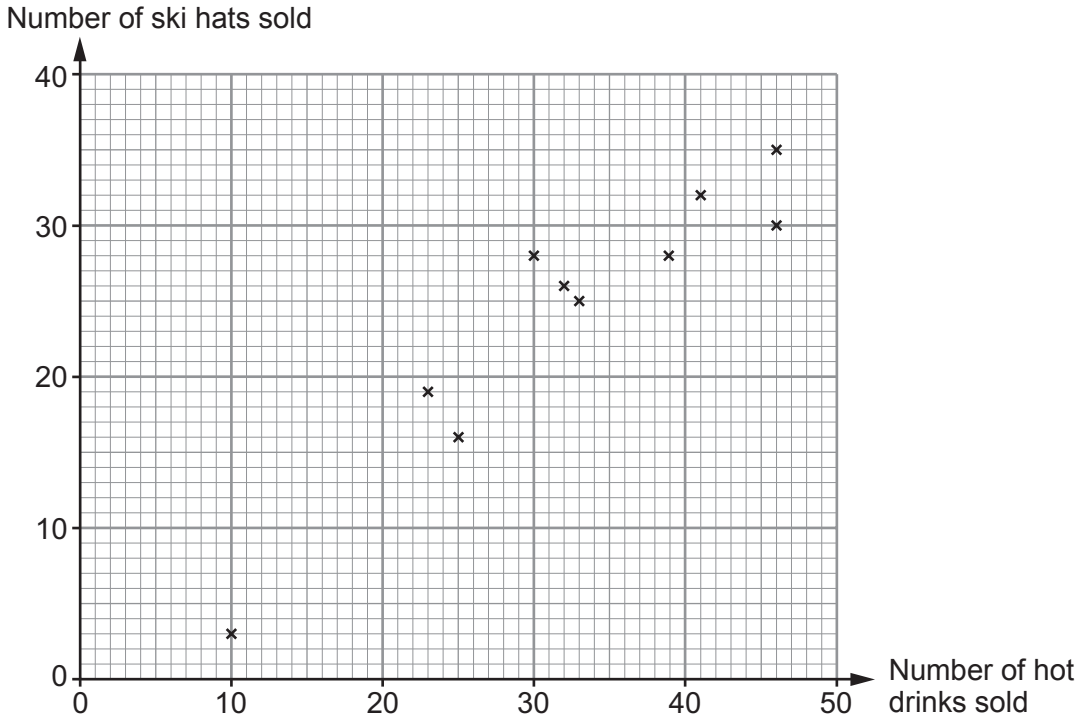
.....

Examiner only

27. *The Shorts Hut* is a shop that sells sports clothing and has a customer café.

(a) The manager plots some sales data in a scatter graph.

The graph shows the number of hot drinks sold and the number of ski hats sold each day for 10 days.



The manager says that this graph shows that an increase in the sale of hot drinks causes an increase in the sale of ski hats because the correlation is positive.

Explain why the manager is incorrect. [1]

.....

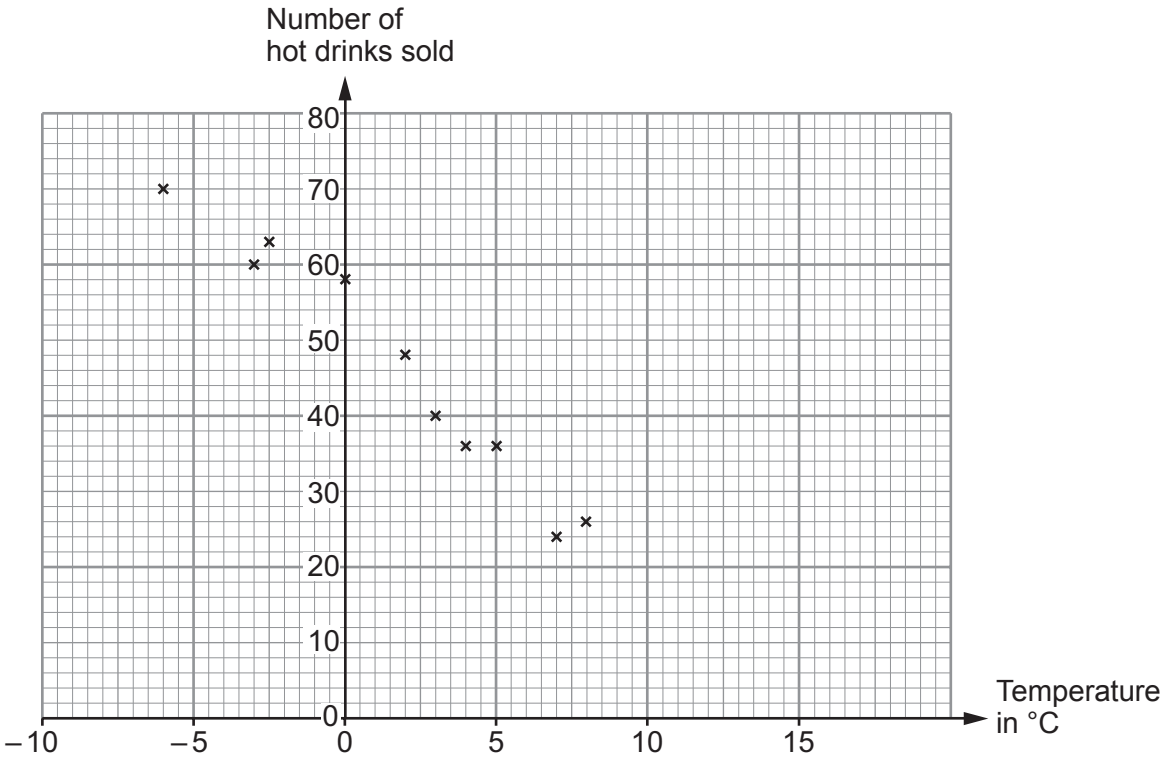
.....

.....

.....

Examiner only

(b) The manager plots another scatter graph showing the temperature, in °C, at 9 a.m. and the number of hot drinks sold during the first hour on each of 10 days.



(i) Draw a line of best fit on the scatter graph. [1]

(ii) Estimate the number of hot drinks the café will sell when the temperature is 6°C. [1]

.....

(iii) Comment on how suitable the graph is for estimating the number of hot drinks sold when the temperature is more than 17°C.
You must give a reason for your answer. [1]

.....

.....

Examiner only

28. Nia and David are trying to work out the area of this sector of a circle.
They must give the answer as a multiple of π.

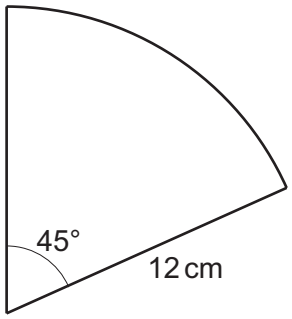


Diagram not drawn to scale

Here is Nia's answer.

Step 1 $360 \div 45 = 8$

Step 2 Area of whole circle = $\pi \times 24$

Step 3 Area of sector = $\frac{1}{8}$ of $24\pi = \frac{24\pi}{8}$

Step 4 Answer = 3π cm^2

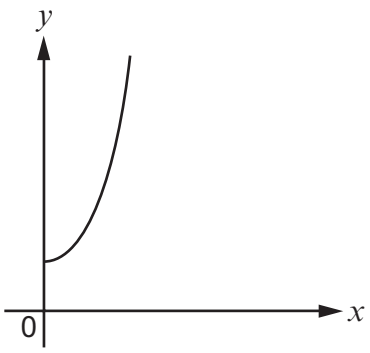
David looks at Nia's answer and says,

'Your answer is wrong.'

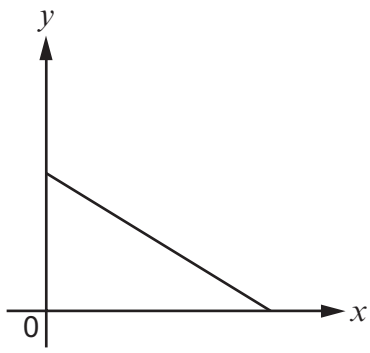
- Explain the error that Nia has made.
- Calculate the correct answer as a multiple of π. [3]

Examiner only

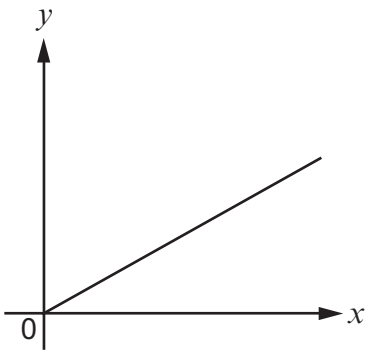
29. Tick (✓) the box below the graph that shows y is inversely proportional to x. [1]



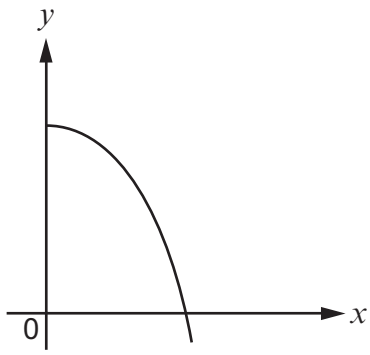
☐



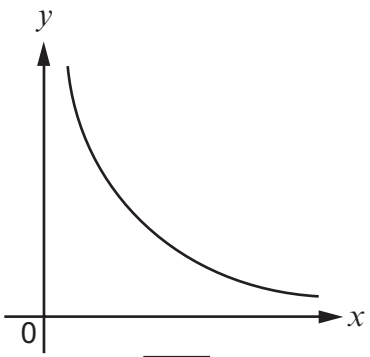
☐



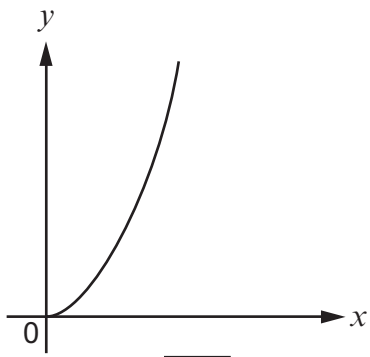
☐



☐



☐



☐

END OF PAPER

Examiner only

For continuation only.