Surname	Centre Number	Candidate Number
Other Names		0

GCSE

C300U10-1

A18-C300U10-1

MATHEMATICS – Component 1
Non-Calculator Mathematics
FOUNDATION TIER

TUESDAY, 6 NOVEMBER 2018

– MORNING

2 hours 15 minutes

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.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**6**	
2.	**4**	
3.	**2**	
4.	**2**	
5.	**6**	
6.	**3**	
7.	**9**	
8.	**6**	
9.	**7**	
10.	**6**	
11.	**4**	
12.	**5**	
13.	**3**	
14.	**5**	
15.	**5**	
16.	**4**	
17.	**7**	
18.*(a)(b)*(i)	**4**	
18.*(b)*(ii)	**2**	
19.	**5**	
20.	**3**	
21.	**4**	
22.	**5**	
23.	**3**	
24.	**7**	
25.	**3**	
Total	**120**	

C300U101
01

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 each of the following.

(i) $5{\cdot}1 \times 10$ [1]

.....

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(ii) $70\,500 \div 100$ [1]

.....

.....

(iii) $\frac{1}{6}$ of 42 [1]

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.....

(iv) 40% of 150 [2]

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(b) Write the following statement using digits and symbols.

Five minus three is not equal to eight. [1]

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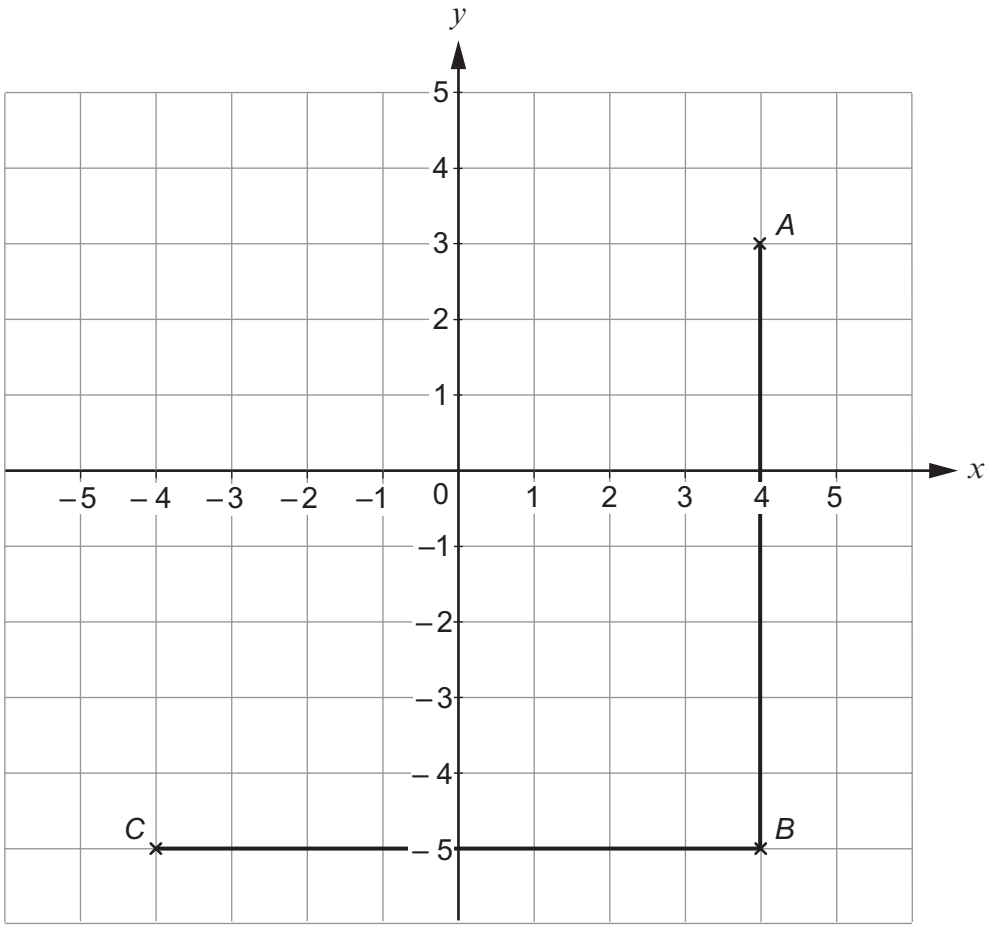
Examiner only

2.



Part of a square, *ABCD*, is drawn accurately on the 1 cm grid above.

(a) On the diagram, mark the position of *D*. [1]

(b) Write down the coordinates of *D*.

D (..... , ...) [1]

(c) Work out the perimeter of the square *ABCD*.
You must state the units of your answer. [2]

.....

.....

Perimeter = ... units .....

Examiner only

3. A small box of chocolates contains c chocolates.
A large box of chocolates contains 15 more chocolates than a small box.

Find an expression for the **total** number of chocolates in 3 small boxes and 1 large box.
You must simplify your answer. [2]

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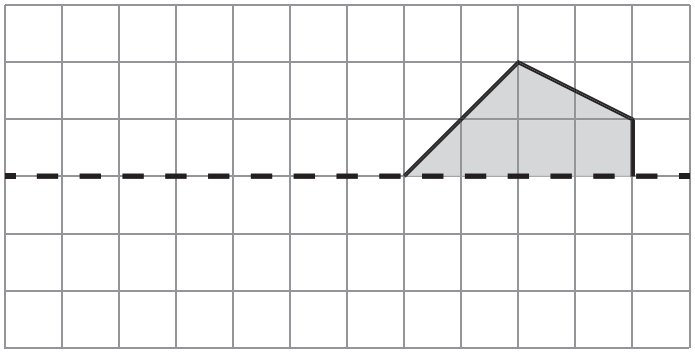
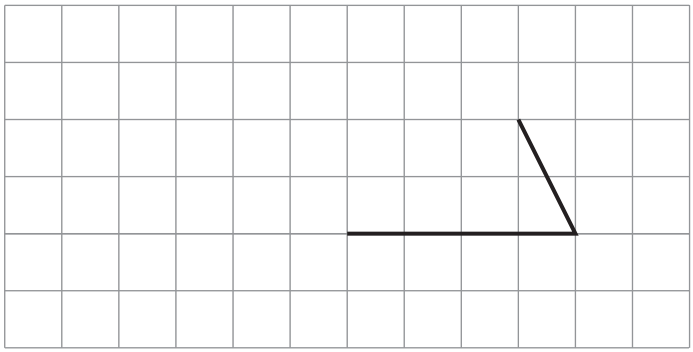
Total number of chocolates = ...

4. *(a)* Draw the reflection of the shape below in the line of symmetry. [1]



(b) Add two more lines to complete the shape below so that it is a quadrilateral with rotational symmetry of order 2. [1]



Examiner only

5. *(a)* In summer, the average temperature at the South Pole is –28°C.
In winter, the average temperature drops to –60°C.

(i) By how many degrees does the average temperature drop from summer to winter? [1]

.....

.....

.....

..... °C

(ii) The average winter temperature at the North Pole is 20°C warmer than the average winter temperature at the South Pole.

What is the average winter temperature at the North Pole? [1]

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..... °C

(b) (i) When two numbers are multiplied, the result is –12.
When the same two numbers are added, the result is 1.

What are the two numbers? [2]

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..... and .....

Examiner only

(ii) When three numbers are multiplied together, the result is 30.
When the same three numbers are added together, the result is 0.

What are the three numbers? [2]

..... and ..... and .....

6. Steven goes on a bike ride.
He rides 4500 metres and it takes him 15 minutes.

(a) Steven continues to ride at the same average speed.
How many metres does Steven ride in one hour? [2]

..... metres

(b) Write down Steven's average speed.
Give your answer in kilometres per hour. [1]

Average speed ..... km/h

Examiner only

7. *(a)* Eve is thinking about joining Dandale Karate Club as a beginner.
The pictogram shows the costs Eve would need to pay to become a club member.

Costs for Club Membership

Beginners' course	
Karate suit	
Club badge	
Association licence	

Key:  represents £10

How much would it cost Eve to become a club member? [2]

.....

.....

To become a club member costs £ .....

(b) Rhiannon is a club member.
She pays £5 for each lesson.
A grading test costs £12.50.

Rhiannon passes her first grading test after 16 lessons.

How much has Rhiannon paid in total for her lessons and grading test? [2]

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Total cost £ .....

Examiner only

(c) In the last 10 years, Dandale Karate Club has had 600 club members.
Only 6 of these have passed the grading test for black belt.

What percentage of the club members have passed the grading test for black belt in the last 10 years? [2]

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..... %

(d) Simon, Anil and Josh are all members of Dandale Karate Club.

Simon is the oldest club member and Anil is the youngest club member.
Simon is 12 times as old as Anil.

(i) Complete the ratio. [1]

Simon's age : Anil's age

..... : .....

(ii) Simon is 60 years old.
Josh is 3 times as old as Anil.

How old is Josh? [2]

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Josh is ..... years old.

Examiner only

8. David is laying a small circle of paving stones in his garden.
The diagram shows the shape of each paving stone.

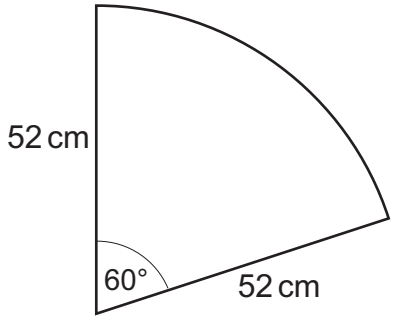

Diagram not drawn to scale

(a) How many paving stones will David need to make a circle? [1]

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.....

..... paving stones

(b) David wants his circle to be **at least** 1 metre in diameter.

Will David's circle be the size he wants? [1]

Yes ☐ No ☐

Explain how you decide.

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Examiner only

(c) David is going to fill the space around the paving stones with gravel.
He works out that he needs 18 small bags of gravel.

Green Garden Centre
Offer of the week
Any small bag of gravel £7.19
Buy 3 bags for the price of 2

(i) **Estimate** how much David will have to pay in total for his gravel from Green Garden Centre.
You must show all your working. [3]

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Estimate £ .....

(ii) Is your answer to part (i) an over-estimate or an under-estimate of the cost of David's gravel?

Over-estimate ☐ Under-estimate ☐

Give a reason for your decision. [1]

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Examiner only

9. The table shows the hourly pay for staff at Dibdales in 2016 and 2017.

		Hourly pay by age group			
		25 and over	21 to 24	18 to 20	Under 18
Year	2017	£8.50	£7.50	£6.00	£4.05
	2016	£8.00	£6.95	£5.55	£4.00

Each member of staff works for 30 hours per week and then overtime if needed.

The total weekly pay of staff at Dibdales is worked out using:

- Paid hours = 30 + (2 × number of overtime hours)
- Total weekly pay = hourly pay × Paid hours

Paul, Janet and Sara all work at Dibdales.

(a) Paul's hourly pay was £8.00 in 2016.
Paul does not work overtime.

How much more did Paul earn for a week in 2017 than he did for a week in 2016? [2]

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£ ..... more

(b) Janet was 19 in 2016.

How much did Janet earn for a week **in 2017** when she worked 5 hours overtime? [2]

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£ .....

(c) One week during this 2-year period, Sara worked 5 hours overtime.
She earned £160.

In which year was this and in which age group was Sara at the time? [3]

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Year ..... Age group .....

Examiner only

10. *(a)* There are 10 marbles in a bag.
The table shows the number of marbles of each colour.

Red	Green	Blue	Pink
4	3	1	2

Meena takes a marble from the bag without looking.

(i) Complete this statement with a colour.

The probability that Meena takes a ..... marble is $\frac{1}{5}$. [1]

.....

(ii) Write down the probability that Meena takes a yellow marble. [1]

.....

(iii) Work out the probability that Meena does **not** take a red or green marble. [2]

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.....

(b) Netta has a tub containing 12 white tennis balls and 8 green tennis balls.
She puts some more green tennis balls into the same tub.
She then chooses a tennis ball at random from the tub.

The probability that Netta picks a white tennis ball is $\frac{2}{5}$.

How many more green tennis balls did Netta put in the tub? [2]

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Examiner only

11. A farmer grows three types of cucumber: Carmen, Green Knight and Marketmore.

(a) The mean and range of the lengths of the Carmen and Green Knight cucumbers grown by the farmer are given in the table.

	Carmen	Green Knight
Mean	21 cm	18 cm
Range	3 cm	5 cm

He sells the type of cucumber that has the most consistent length to a local cafe and sells the other variety in his farm shop.

Which variety is sold to the local cafe?

Carmen ☐ Green Knight ☐

Explain how you decide. [1]

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(b) The farmer picks a sample of 5 Marketmore cucumbers and measures their length.

The lengths of the first 4 cucumbers, in cm, are

15 12 13 13

The mean length of the 5 cucumbers is 13 cm.

What is the length of the 5th Marketmore cucumber? [3]

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..... cm

Examiner only

12. *(a)* Circle **all** the fractions in the list that are equivalent to $\frac{20}{30}$. [2]

$\frac{15}{25}$ $\frac{2}{3}$ $\frac{30}{45}$ $\frac{3}{2}$ $\frac{4}{6}$

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(b) Sangita thinks that $3 \times \frac{1}{7} = \frac{3}{21}$.

Explain why Sangita is wrong. [1]

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(c) Work out $\frac{3}{4} + \frac{1}{6}$. [2]

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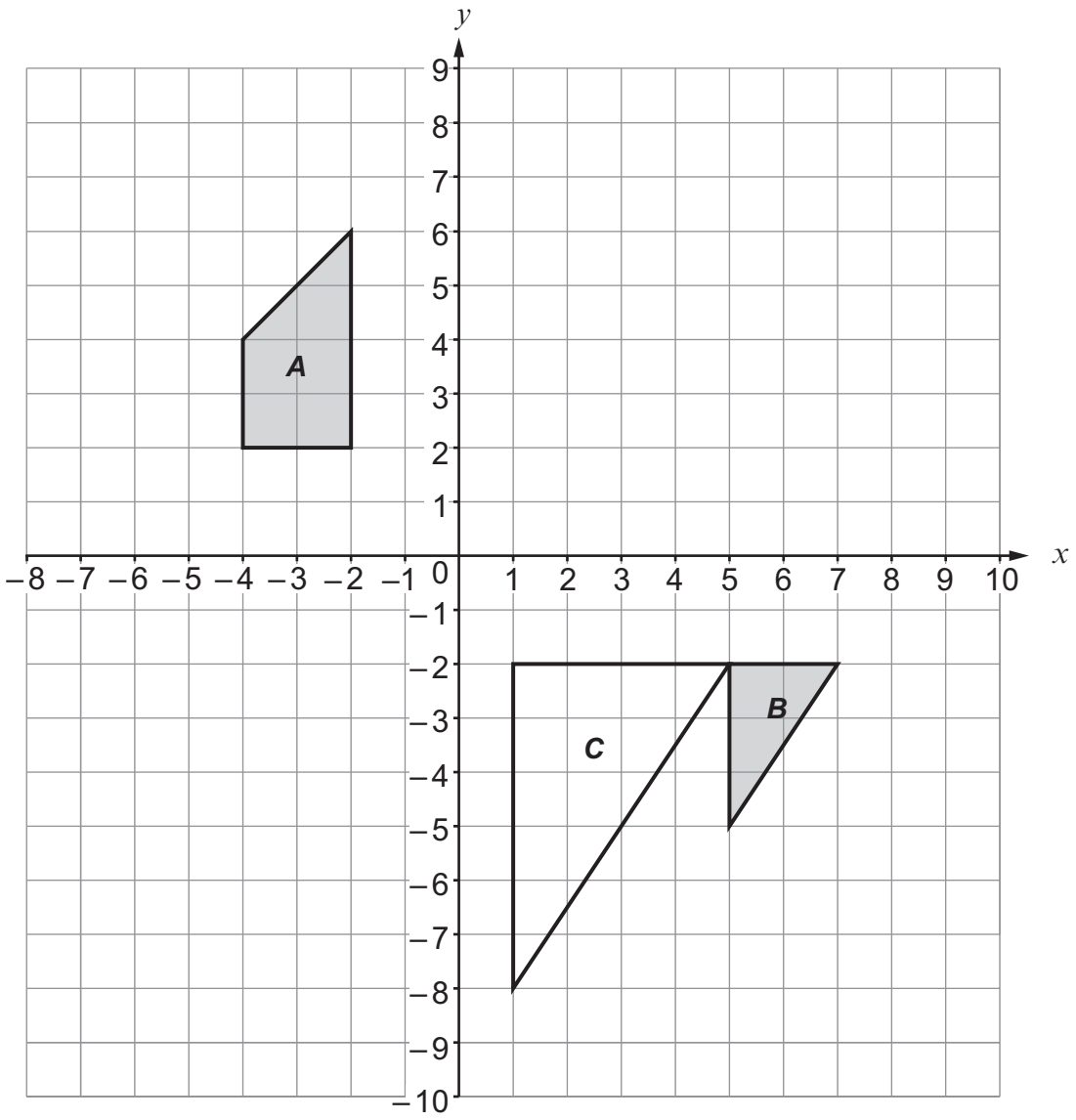
C300U101
15

Examiner only

13.



(a) On the grid, draw the image of **shape *A*** after a rotation of 90° clockwise about (0, 0). [2]

(b) Triangle *C* is the image of **triangle *B*** after an enlargement with scale factor 2.

On the grid, mark the position of the centre of this enlargement and label it *P*. [1]

Examiner only

14. Sharon is making food for a family picnic.
She has 1800 grams of plain flour and plenty of all the other ingredients she needs.

(a) She makes pieces of shortbread using this recipe.

Shortbread (makes 20 pieces)	
100 grams	caster sugar
200 grams	butter
300 grams	plain flour

She uses 750 grams of her plain flour to make her shortbread mixture.

How many pieces of shortbread does Sharon make? [2]

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..... pieces

(b) Sharon uses the plain flour she has left to make as many apple cakes as possible.
To make one apple cake, she needs 200 grams of plain flour.

How many apple cakes does Sharon make?
You must show all your working. [3]

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..... apple cakes

Turn over.

Examiner only

15. *(a)* Alan keeps fit by walking and weight training.
The times he spends walking and weight training are in the ratio 4 : 3.

One month Alan walks for 18 hours.

Work out the number of hours Alan spends weight training during this month. [2]

Weight training ..... hours

(b) Rashmi is training for a triathlon.
The number of hours she spends swimming, cycling and running are in the ratio

7 : 3 : 2

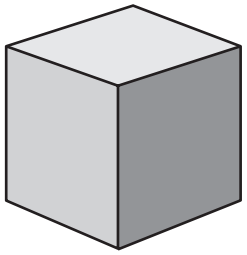
One month Rashmi trains for 48 hours.

How many **more** hours does she spend swimming than she does running during this month? [3]

..... hours more

Examiner only

16. A solid cube of metal is at rest on horizontal ground.
The cube has sides of length 10 cm.



(a) Find the area of one of the faces of the cube. [1]

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Area ..... cm^2

(b) The cube has a mass of 0·8 kg.

A mass of 1 kg has a weight of approximately 10 newtons.

Calculate the approximate weight of the cube. [1]

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Approximate weight ..... N

(c)

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

Use the given formula and your answers to *(a)* and *(b)* to find the pressure made by the cube on the ground.
Give your answer as a decimal. [2]

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Pressure ..... N/cm^2

Examiner only

17. *(a)*

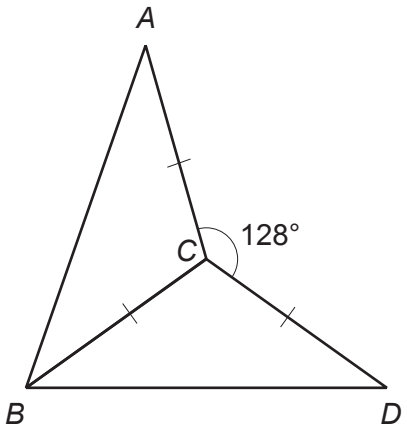

Diagram not drawn to scale

The diagram shows two triangles *ABC* and *BDC*.
These triangles are both congruent and isosceles.

Find the size of $B\hat{A}C$. [4]

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$B\hat{A}C$ ..... °

Examiner only

(b)

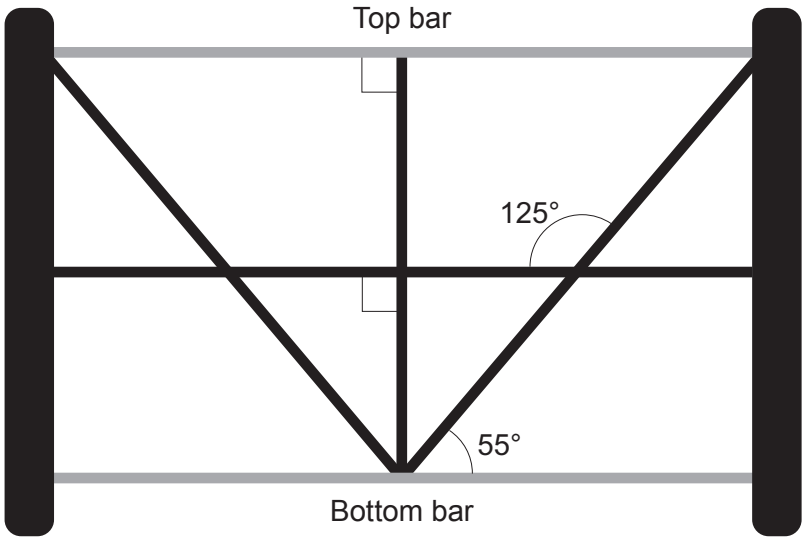

Diagram not drawn to scale

The diagram shows part of a garden gate made from straight metal bars.

Show that the top bar is parallel to the bottom bar.
Label the diagram with any angles you use. Give a reason for each step. [3]

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Examiner only

18. *(a)* (i) Write down the value of $\sqrt[3]{8}$. [1]

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(ii) Simplify $\sqrt{5} \times \sqrt{5}$. [1]

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(b) (i) Work out the value of $(2 \times 10^4) \times (4 \times 10^3)$.
Give your answer in standard form. [2]

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(ii) Light travels at 3×10^5 kilometres per second.
The circumference of the Earth at the equator is 40 000 km.

Show that, in theory, a beam of light could circle the Earth at the equator more than 7 times in 1 second. [2]

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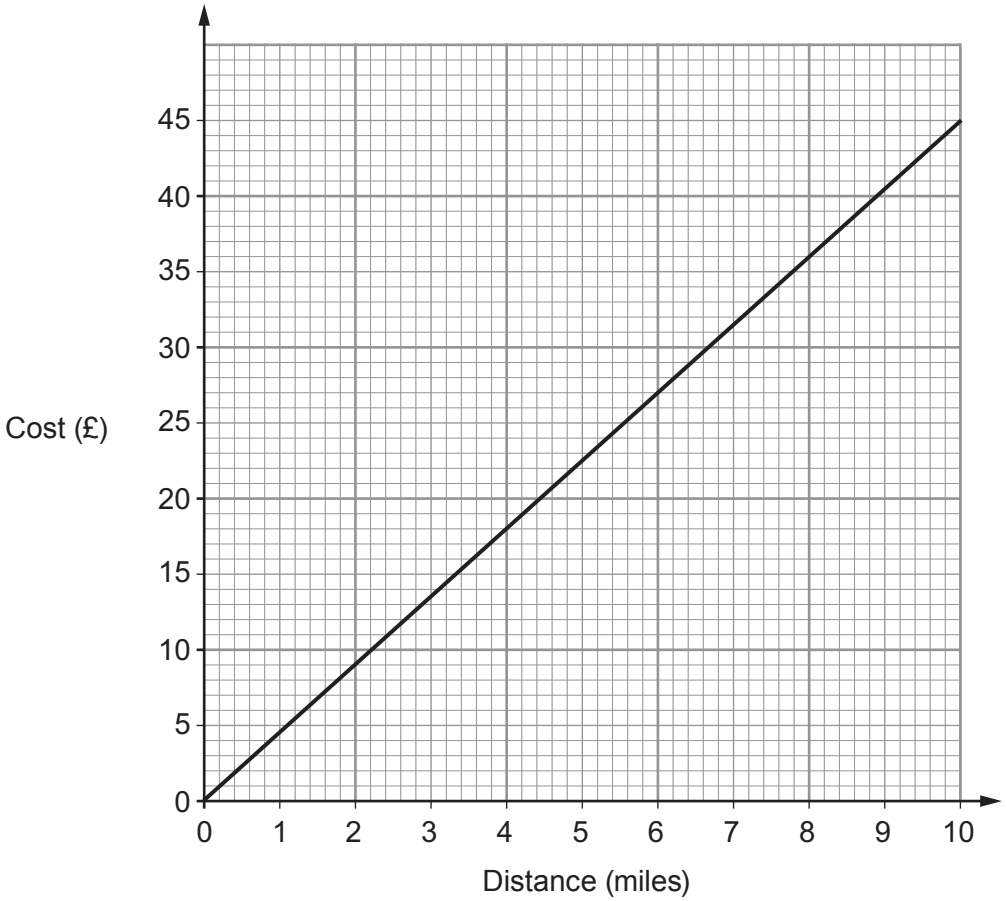
Examiner only

19. The graph shows the cost of delivery for goods bought at a furniture shop.



(a) Ceri buys a sofa from this shop and has it delivered.
Ceri lives 4 miles from the shop.

How much does Ceri pay for the delivery? [1]

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.....

(b) (i) Tick the correct statement about the distance and cost. [1]

They are not in proportion. ☐

They are in inverse proportion. ☐

They are in direct proportion. ☐

They are in indirect proportion. ☐

(ii) Find the gradient of the line and state what it represents in this context. [3]

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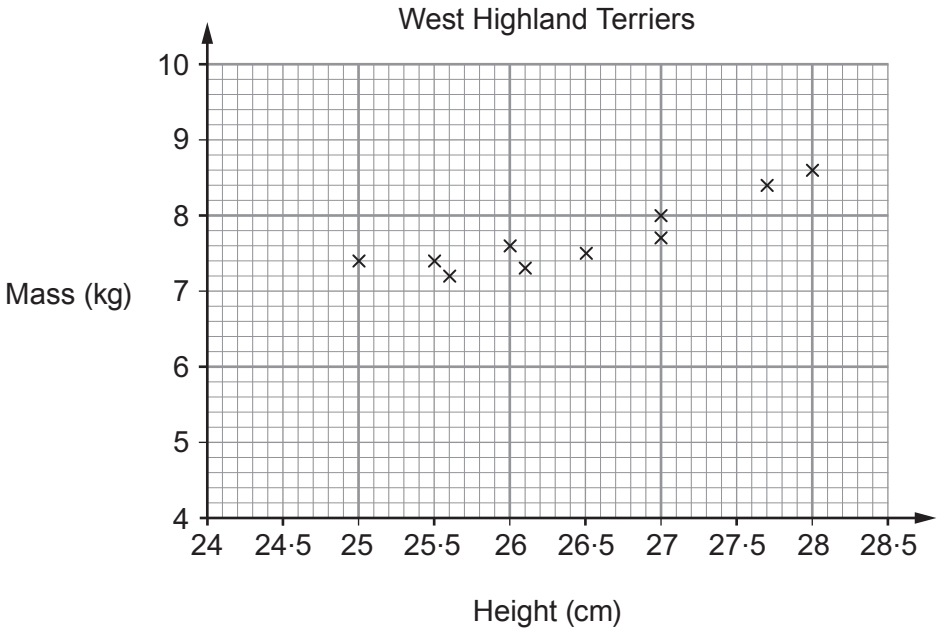
Examiner only

20. The scatter diagram shows the height and mass of 10 dogs.
These dogs are all West Highland Terriers.



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

(b) Estimate the mass of a West Highland Terrier that has a height of 26·7 cm. [1]

Estimated mass is ..... kg

(c) Another dog has a mass of 8·2 kg and a height of 35 cm.

Is this dog likely to be a West Highland Terrier?

Yes ☐ No ☐

Explain your answer. [1]

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Examiner only

21.

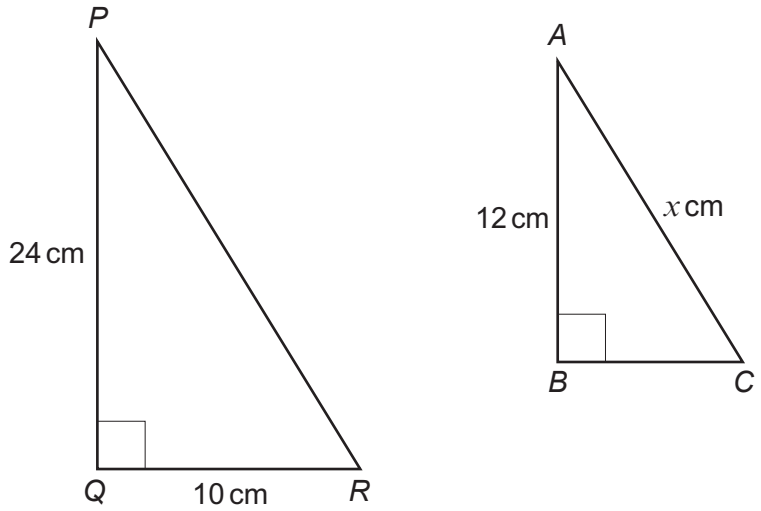

Diagram not drawn to scale

The diagram shows two similar, right-angled triangles, *PQR* and *ABC*.

Find the value of x. [4]

x = ...

Examiner only

22. It takes

- 2 park keepers 1 hour to weed 2 flowerbeds
- 3 park keepers 2 hours to prune 6 trees.

At 9 a.m. one morning, 5 park keepers start work as follows.

Number of park keepers	Activity
2	Weed: **2** flowerbeds
3	Prune: **13** trees

When one activity has been completed all the park keepers work on the other activity.
You may assume that all the park keepers work at the same rate and are equally skilled.

How long does it take for the park keepers to complete the pruning and weeding?
You must show all your working. [5]

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Total time = ... hours

Examiner only

23. *(a)* Factorise $x^2 + 2x - 15$. [2]

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(b) Write down the solutions of the equation $x^2 + 2x - 15 = 0$. [1]

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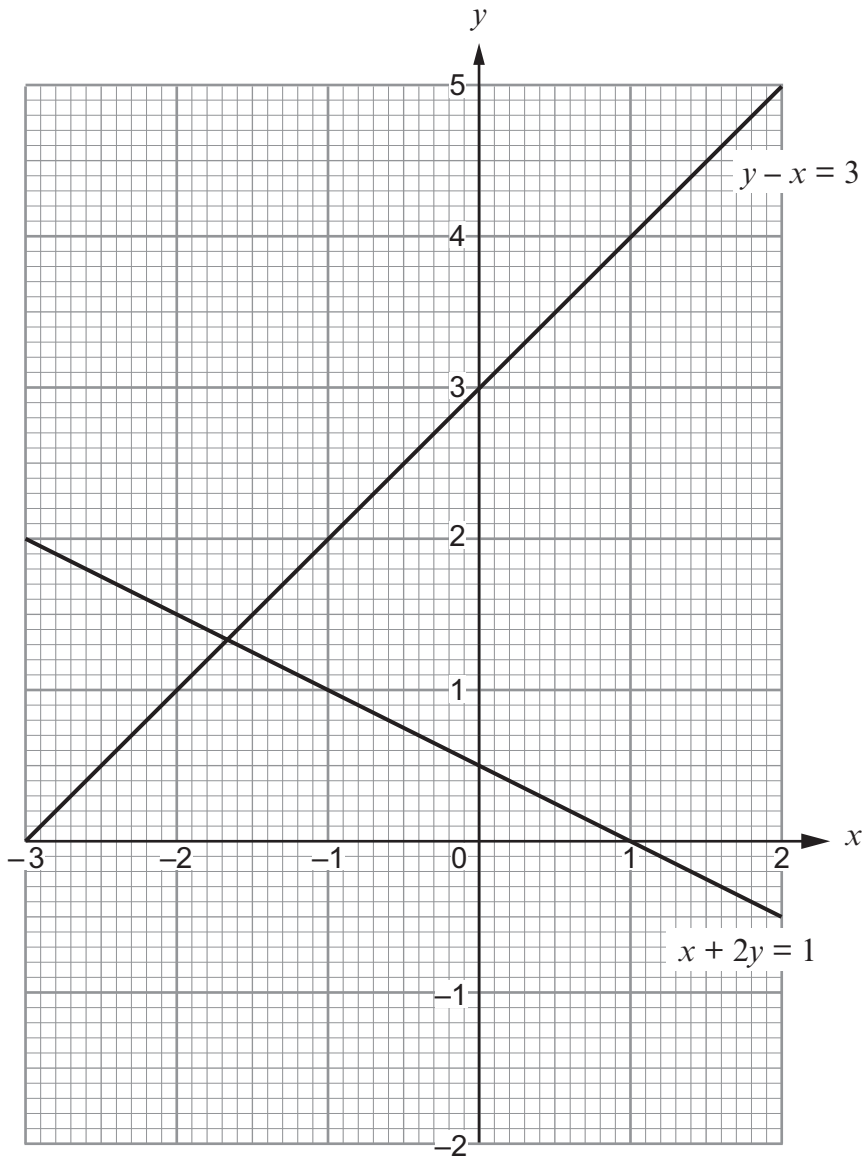
Examiner only

24. *(a)*



Use the diagram to solve the simultaneous equations

$$y - x = 3,$$

$$x + 2y = 1.$$

Give your answers correct to 1 decimal place. [2]

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Examiner only

(b) A theme park sells entrance tickets.

2 adult tickets and 3 child tickets would cost a total of £72.
3 adult tickets and 1 child ticket would cost a total of £66.

A family ticket costs £45 and allows entry for 2 adults and 2 children.

How much cheaper is it to buy a family ticket than it would be to buy 2 adult and 2 child tickets? [5]

It is £ ..... cheaper to buy a family ticket.

Examiner only

25. Mike wants to find out how many fish there are in his lake.

On Monday evening,
Mike captured a random sample of 100 fish and tagged them.
He then released them back into the water.

On Tuesday evening,
Mike captured a second random sample of 50 fish and counted the number that had been tagged.

He found that 10 of the fish in the second sample had been tagged.

Mike will allow fishing at his lake when there are more than 800 fish.

You may assume that the number of fish in the lake stays the same between the two samples being taken.

Should Mike allow fishing at his lake?
Show calculations to justify your decision. [3]

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Decision: Allow fishing ☐ Do not allow fishing ☐

END OF PAPER

Examiner only

For continuation only.