Surname	Centre number	Candidate number
First name(s)		0

GCSE

3320U20-1

GCSE Mathematics and Numeracy (Double Award)
Unit 2: Non-calculator
Higher Tier

1 hour 45 minutes

SAMPLE ASSESSMENT MATERIALS

Additional materials

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

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

Instructions to candidates

Use black ink or black ball-point pen. Do **not** use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

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

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

If you need more space, use the additional page(s) at the back of this booklet. Number the question(s) correctly.

Take π as 3·14.

Information for candidates

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

In question 4, the assessment will take into account the quality of your mathematical organisation, communication and accuracy in writing.

For examiner's use only		
Question	**Maximum mark**	**Mark awarded**
1.	3	
2.	4	
3.	3	
4.	6	
5.	3	
6.	3	
7.	5	
8.	4	
9.	3	
10.	4	
11.	4	
12.	3	
13.	4	
14.	4	
15.	4	
16.	3	
17.	2	
18.	5	
19.	4	
20.	3	
21.	3	
22.	3	
Total	**80**	

Answer **all** questions.

1. Solve $13d + 9 = 5d - 31$. [3]

Examiner only

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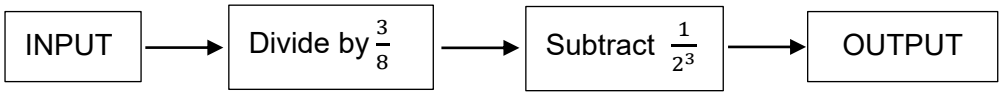
2. A number machine is shown below.



The INPUT number is $2\frac{5}{8}$.

What is the OUTPUT number?

Give your answer as a mixed number. [4]

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3. Find the size of each of the angles marked a, b and c. [3]

Examiner only

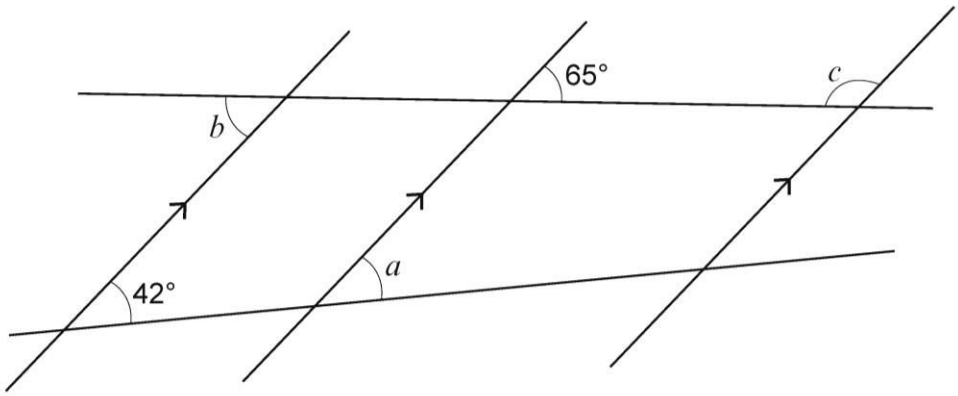

Diagram not drawn to scale

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a = …… ° b = …… ° c = …… °

Examiner only

4. *In this the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

There is a large number of beads in a bag.
There are 4 different colours of beads in this bag: yellow, red, black and white.

The number of yellow beads is the same as the number of red beads.
There are twice as many black beads as white beads.

A bead is selected at random.
The probability that it is a black bead is 0.44.

Calculate the probability that the bead selected is red.
You must show all your working. [4 + 2 OCW]

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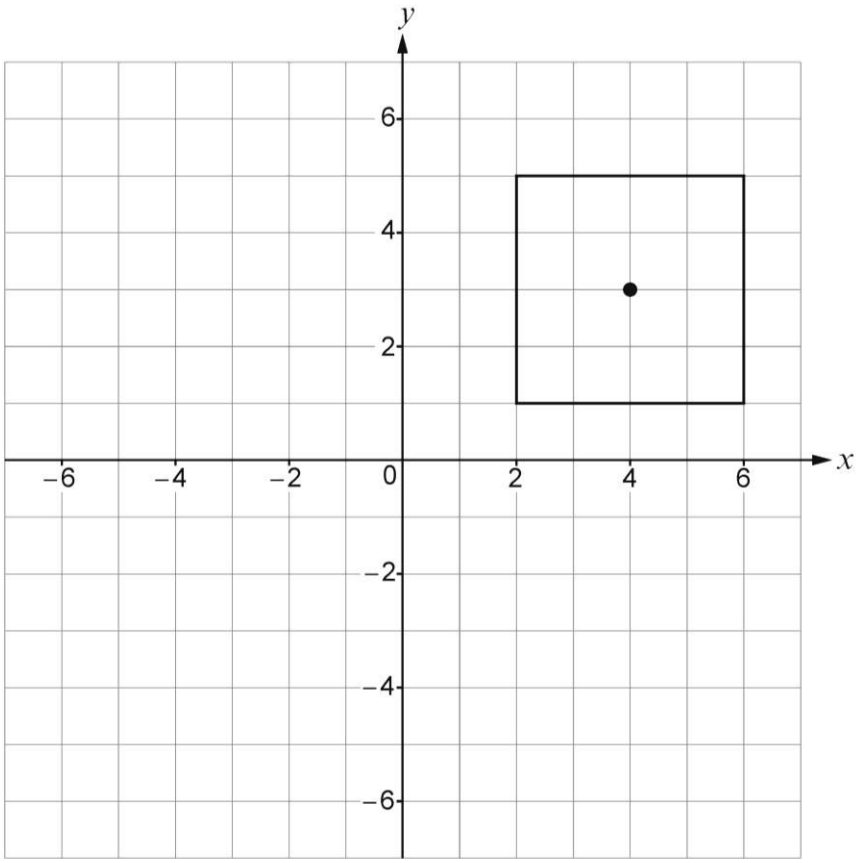
5. (a) The diagram below shows a square with its centre marked with a circle. It is rotated 90° anticlockwise about the origin. [1]

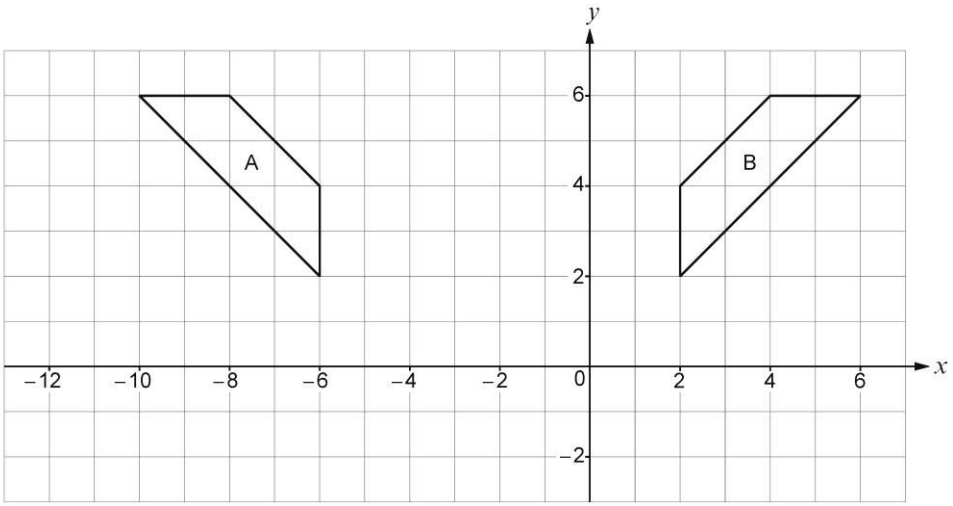
Examiner only



Indicate the centre of the square at its new position on the diagram above.

(b) The diagram shows two shapes, labelled **A** and **B.** [2]

Examiner only



Describe fully a single transformation that maps shape A onto shape B.

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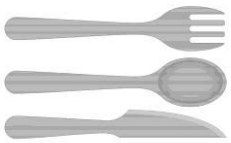
Examiner only

6. Delyth is making some packs of wooden cutlery for her food stall at the market. Each pack contains one knife, one fork and one spoon.



To make up these packs, Delyth buys:

- some boxes that contain 14 wooden knives each
- some boxes that contain 16 wooden forks each
- some boxes that contain 10 wooden spoons each.

Delyth wants to buy the **least possible number of boxes** so that, in making up the packs, she uses **all** of the knives, forks and spoons she has bought.

Complete the table below to show the number of boxes of each item that Delyth needs to buy.
You must show all your working. [3]

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	Number of boxes needed
Knives (14 in each box)	…….. boxes
Forks (16 in each box)	…….. boxes
Spoons (10 in each box)	…….. boxes

7. Rhodri Jones works with his 2 daughters in their family business. [5]

Examiner only

Rhodri is x years old, where x is a whole number.
Megan, his older daughter, is $(x - 23)$ years old.
Gwenda, his younger daughter is 5 years younger than Megan.

On the Jones family business website, it states the following:

> Well-established family business!
> The total age of our 3 workers is greater than 100 years.

Form and solve an inequality to find the youngest possible age Rhodri could be for the last statement to be true.

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Examiner only

8. Oranges are transported in boxes in a refrigerated truck.

There are 50 oranges in each layer of the box.
Each box has 4 layers of oranges.

One of the boxes of oranges is opened for inspection.
The number of rotten oranges in each of the 4 layers in this box is listed below.

4 0 3 2

(a) Write down the best estimate for the relative frequency of the rotten oranges in a different box of oranges. [2]

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(b) There are 5000 oranges on the truck in total. [2]
How many rotten oranges would you expect to find in these 5000 oranges?

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9. Use approximation to estimate $\sqrt[3]{\frac{27002}{8.05^2}}$. [3]

Give your answer correct to 2 significant figures.
You must show all your working.

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Examiner only

10. Every weekend, Ravi works on Saturday and on Sunday.
Ravi is given one job to do on Saturday and one job to do on Sunday.
The options for the job he could be given on either day are:

- answer the phone
- pack boxes.

On any weekend, the probability that Ravi is given the job to:

- answer the phone on Saturday is 0.2
- pack boxes on Sunday is 0.6.

The job given to Ravi on one day is independent of the job given to him on the other day.

(a) Complete the tree diagram below. [2]

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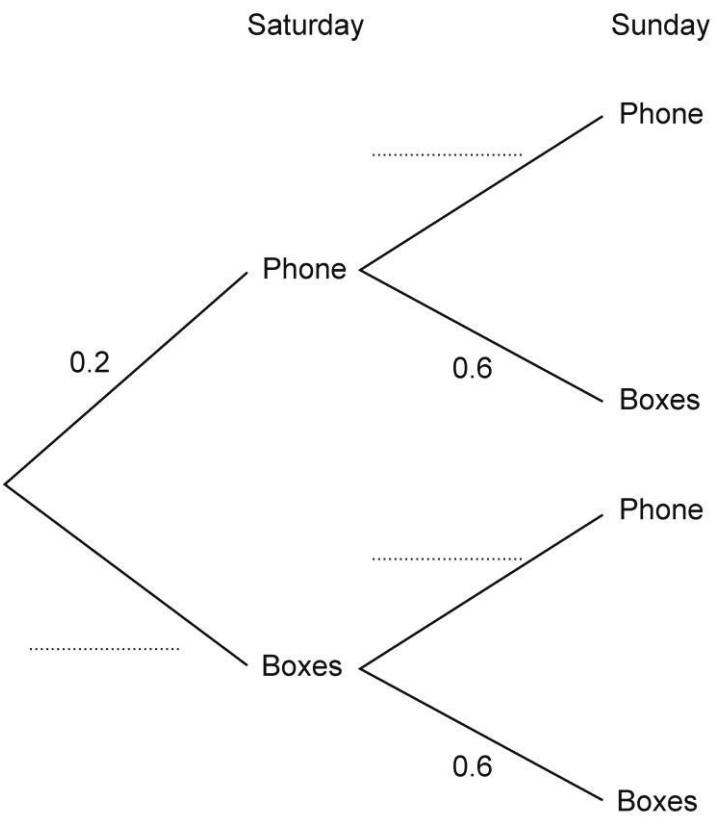

(b) Calculate the probability that, next weekend, Ravi is given the job to pack boxes on Saturday and on Sunday. [2]

Examiner only

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11. (a) When evaluated, which two of the calculations below are equal? [2]
Complete the statement with your decision and the evaluation of these calculations.

Examiner only

4.1×8 4100×0.08 41×80

$41 \div \frac{1}{8}$ 410×0.008 $410 \div \frac{1}{80}$

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..…… and …….…… are both equal to ……..…….

(b) Which two of the following numbers are equal? [2]
Complete the statement with your decision and the simplified value of these two numbers.

$\frac{1}{2^2}$ $8^{\frac{2}{3}}$ $\sqrt[3]{16}$

64^3 $\frac{1}{0.25}$ $0.25^{\frac{1}{2}}$

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..…… and …….…… are both equal to ……..…….

12. Factorise $x^2 - 13x + 40$. [3]
Hence, solve $x^2 - 13x + 40 = 0$.

Examiner only

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13. Here is a linear sequence of numbers.

2298 2284 2270 2256

Find the first number in the sequence that is less than zero. [4]
Which term of the sequence is this?

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14. (a) Points *A*, *B, C* and *D* lie on the circumference of a circle. [2]

Examiner only

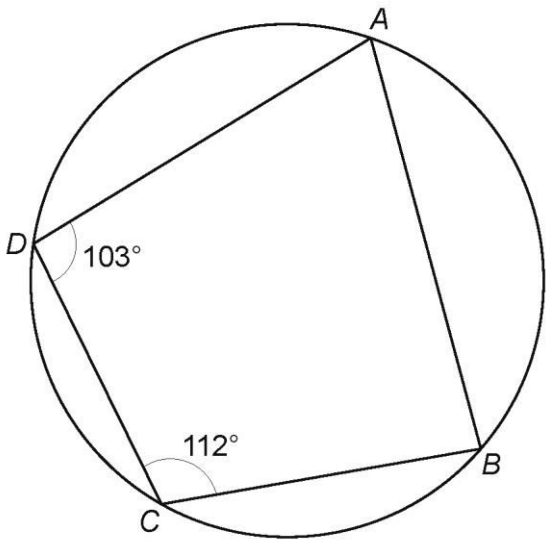

Diagram not drawn to scale

Calculate the size of $A\hat{B}C$.
You must give a reason for your answer.

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(b) Points *P*, *Q* and *R* lie on the circumference of a circle, centre *O*. [2]
The straight line *XPY* is a tangent to the circle at *P*.

Examiner only

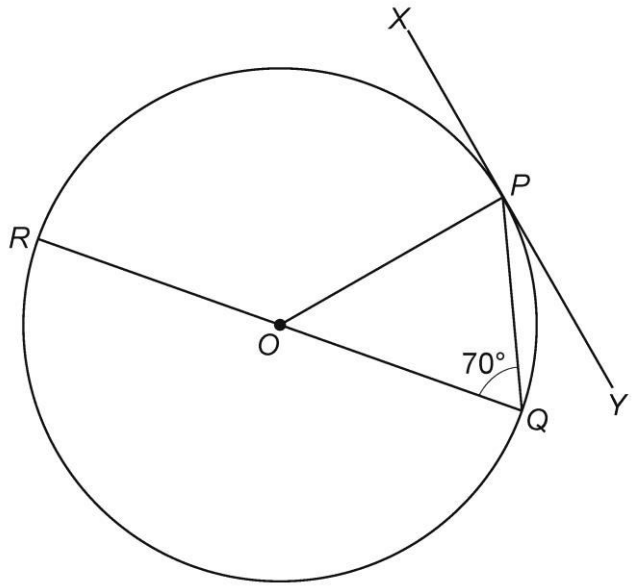

Diagram not drawn to scale

Calculate the size of $Y\hat{P}Q$.

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15. Evaluate $0.\dot{4}\dot{2} \times \left(\frac{7}{4^{\frac{1}{2}} + 2^6}\right)^{-1}$. [4]

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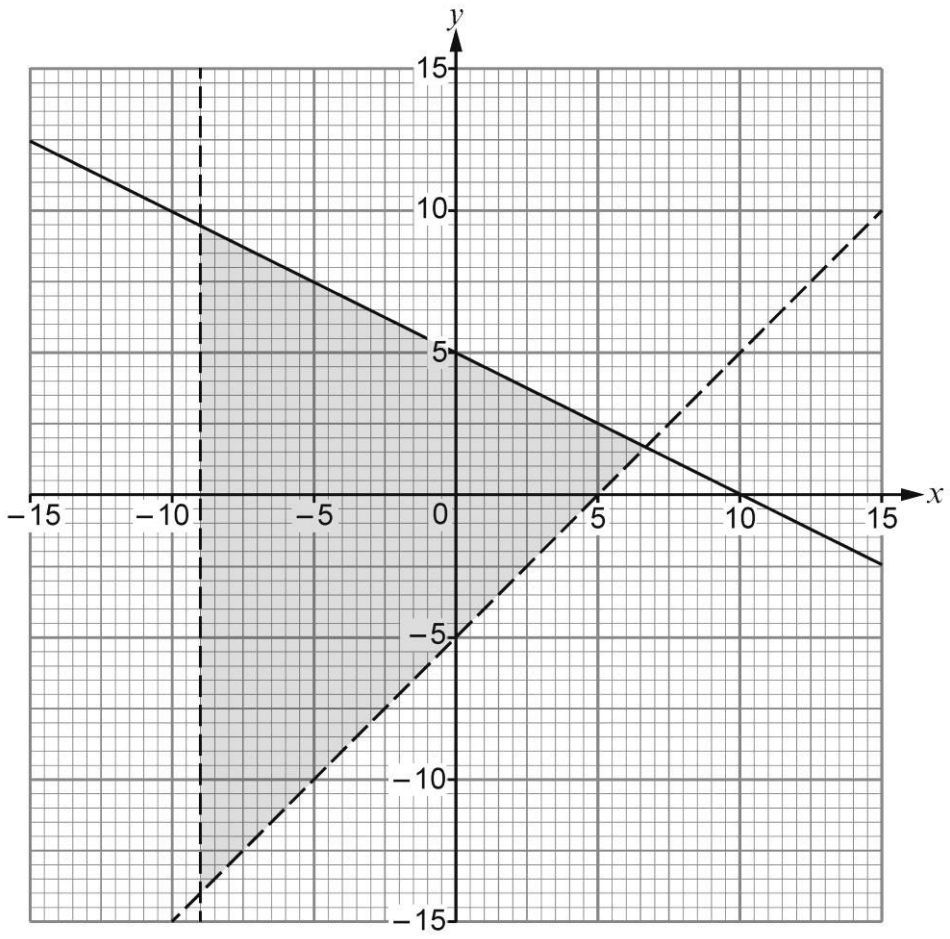
16. [3]

Examiner only



Complete the following table to give the set of inequalities that describes the shaded region shown above.
One of the inequalities has already been written for you.

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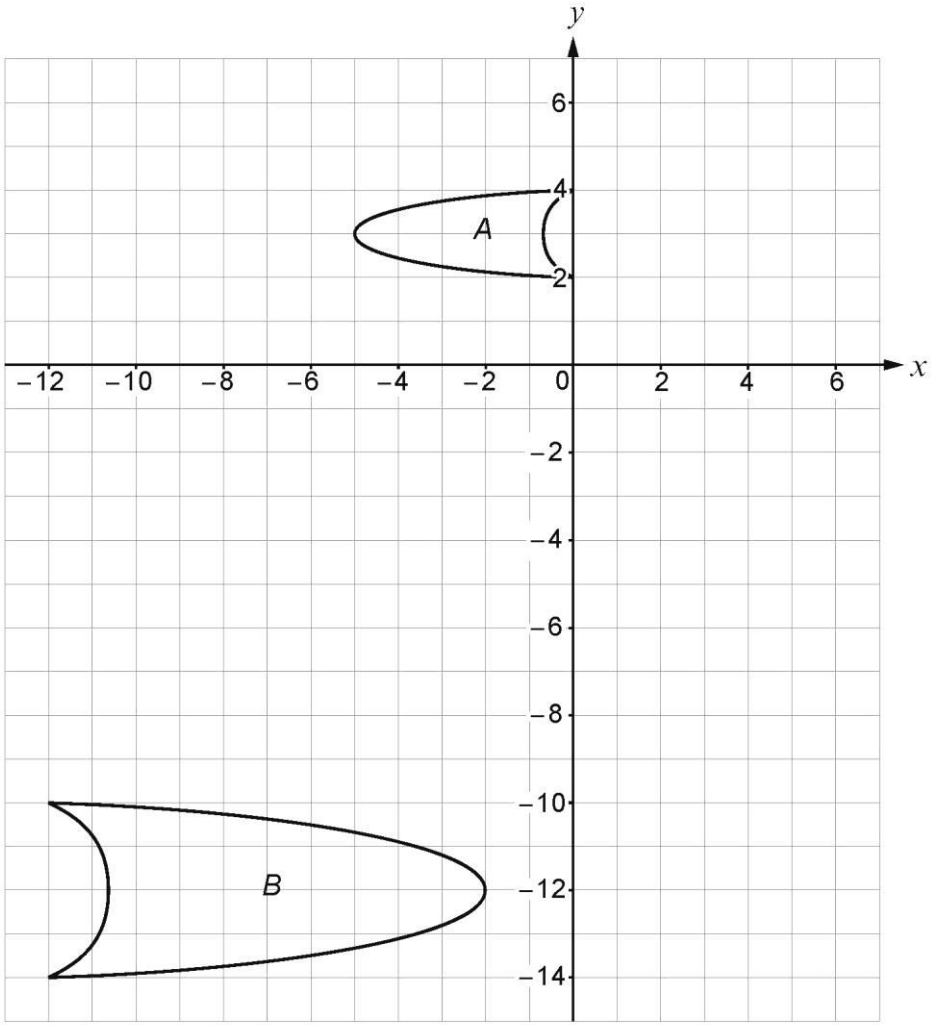
$x > -9$

17. An original sketch has been enlarged. [2]
The diagram below shows the original sketch and the enlargement of this sketch.

The original sketch is labelled *A.*
The enlargement is labelled *B*.



Find the scale factor and the coordinates of centre of the enlargement.

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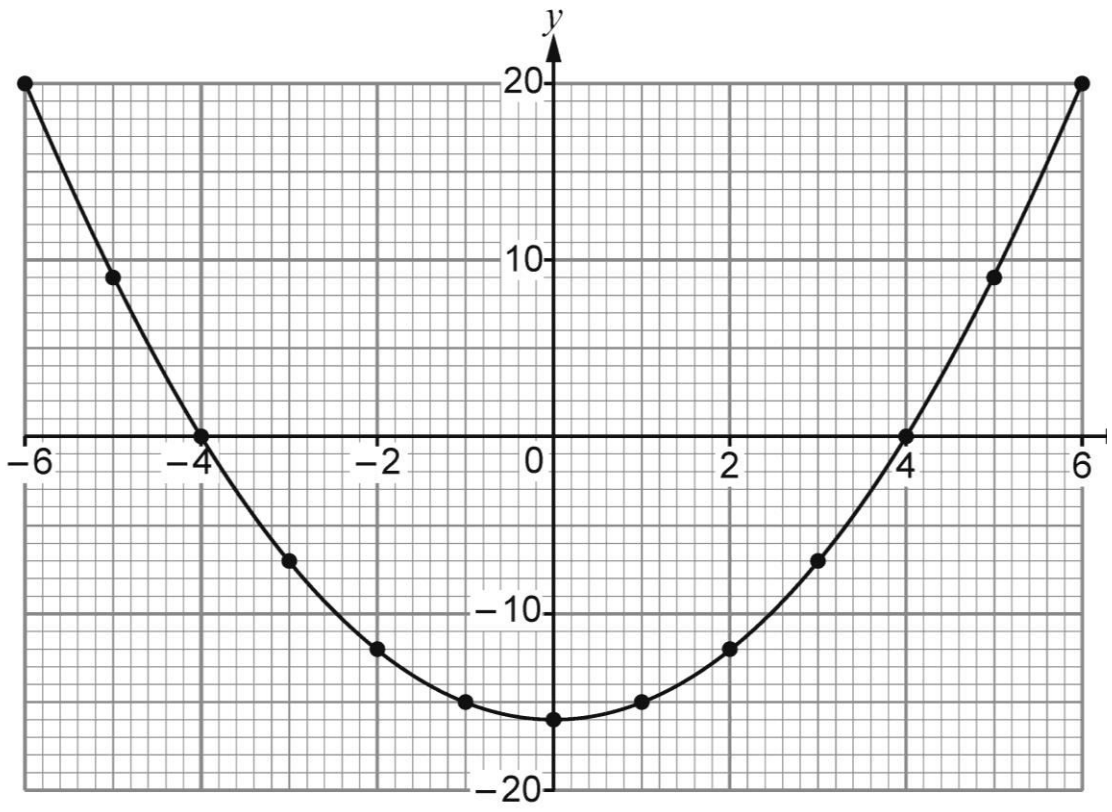
Scale factor is ……

Centre of the enlargement (…… , ……)

Examiner only

18. The graph of $y = (x + 4)(x - 4)$ is shown below. [5]

Examiner only



By drawing an appropriate straight line on the graph, solve $x^2 - 11 = 0$.

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Solutions are $x =$ ……..…. and $x =$ ……..

19. Make g the subject of the following formula. [4]

Examiner only

$$gh = \sqrt[3]{27g^3 + 7}$$

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20. Find the value of $(\sqrt{75} - \sqrt{3})^2$. [3]

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21. Simplify $\frac{4w^2-9}{8w^2-12w}$.

[3]

Examiner only

You must show all your working.

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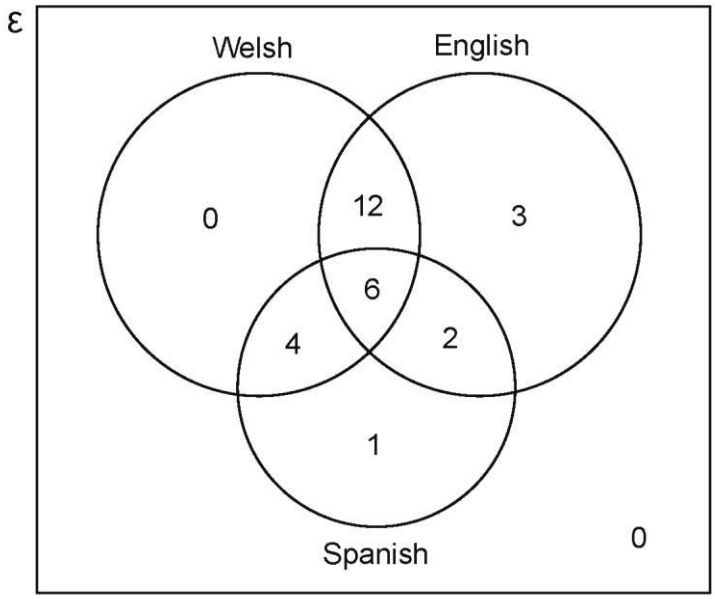
22. At an international climate conference, 28 students were asked what languages they speak.
The results are shown in the Venn diagram below. [3]

Examiner only



Three students are selected at random to meet the conference organiser.

Calculate the probability that at least one of these students speaks Spanish.

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END OF QUESTIONS

Examiner only

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.
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