GCSE

WJEC GCSE Mathematics and Numeracy (Double Award)

Approved by Qualifications Wales

Sample Assessment Materials

Unit 2: Non-calculator
Higher Tier
Teaching from 2025
For award from 2026

This Qualifications Wales regulated qualification is not available to centres in England.

Made for Wales.
Ready for the world.

WJEC would like to thank the students and teachers of Fitzalan High School, Cardiff and Llanwern High School, Newport for their participation in the creation of these covers.

Contents

Surname	Centre number	Candidate number
First name(s)		0

GCSE

3320UB

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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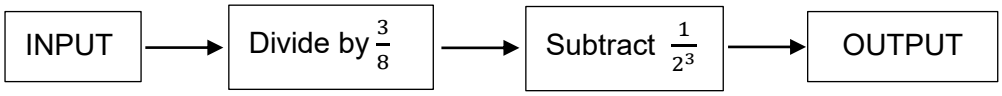
2. A number machine is shown below.



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

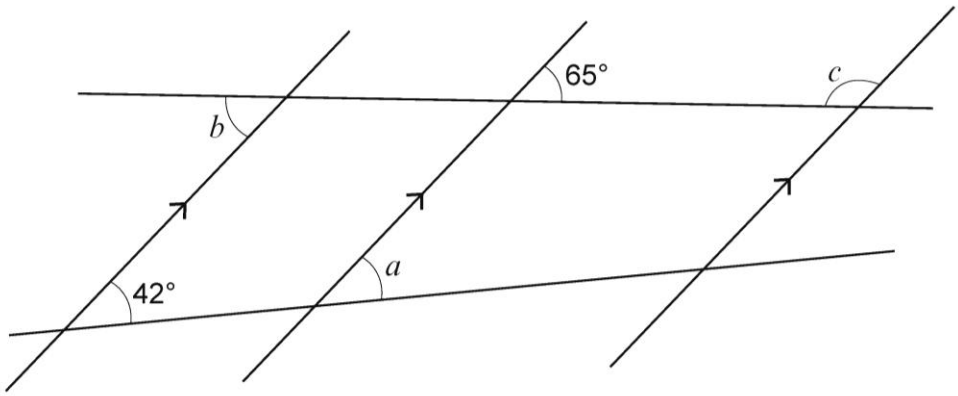

Diagram not drawn to scale

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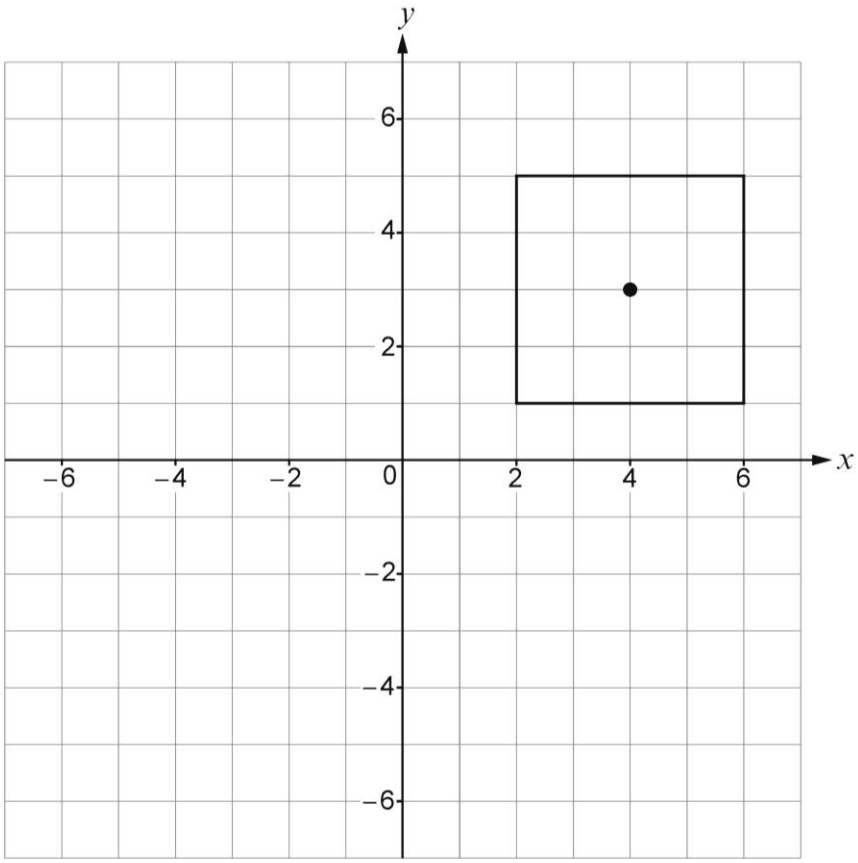
5. (a) The diagram below shows a square with its centre marked with a circle. It is rotated 90° anticlockwise about the origin. [1]

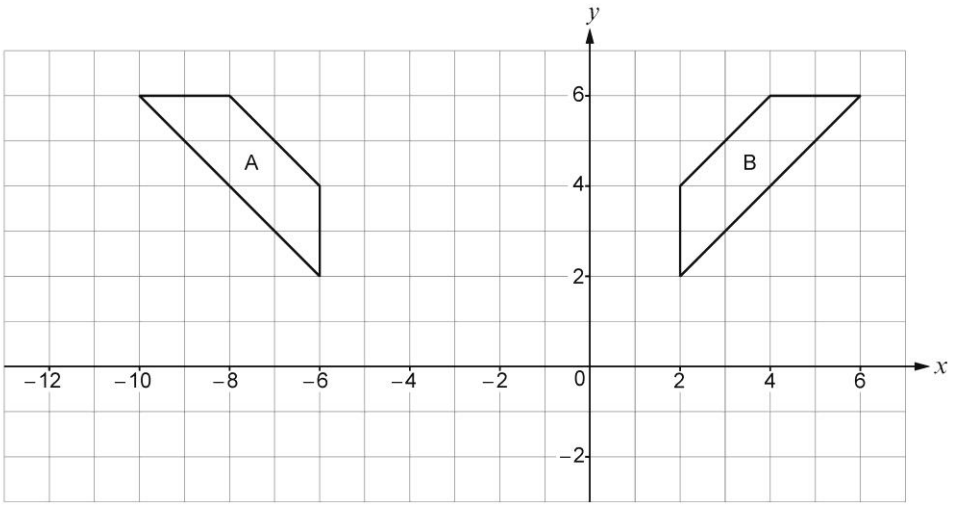
Examiner only



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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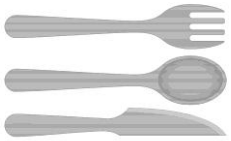
Examiner only

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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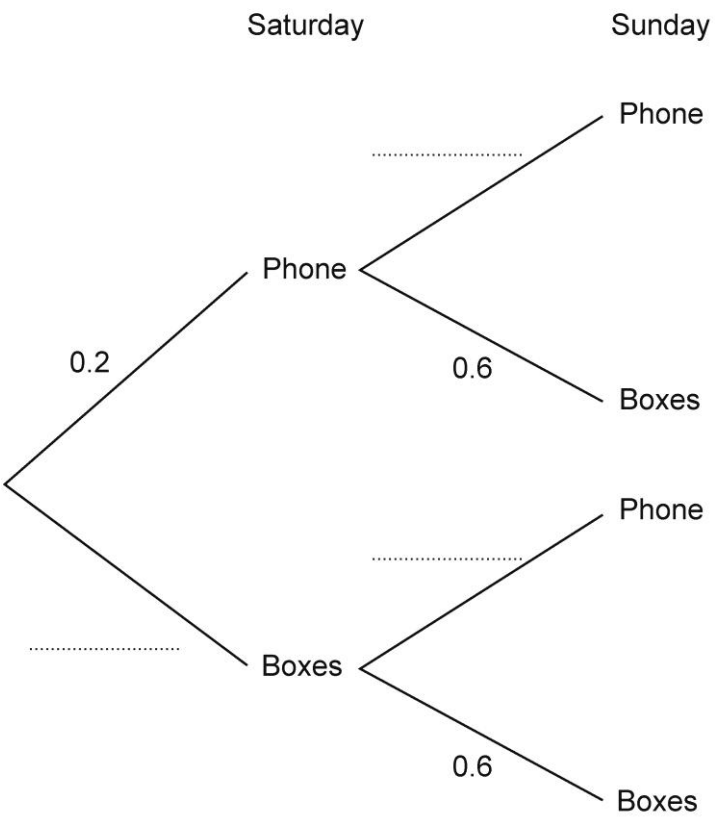

(b) Calculate the probability that, next weekend, Ravi is given the job to pack boxes on Saturday and on Sunday. [2]

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

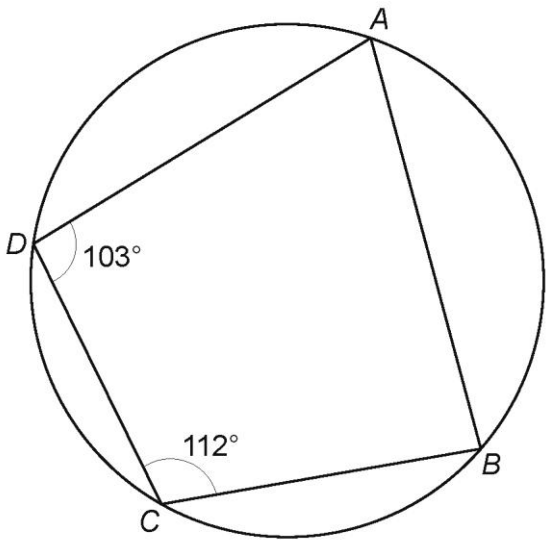

Diagram not drawn to scale

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

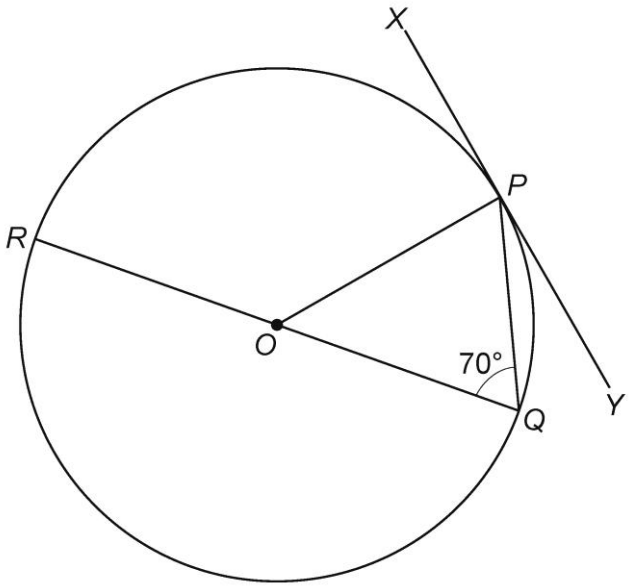

Diagram not drawn to scale

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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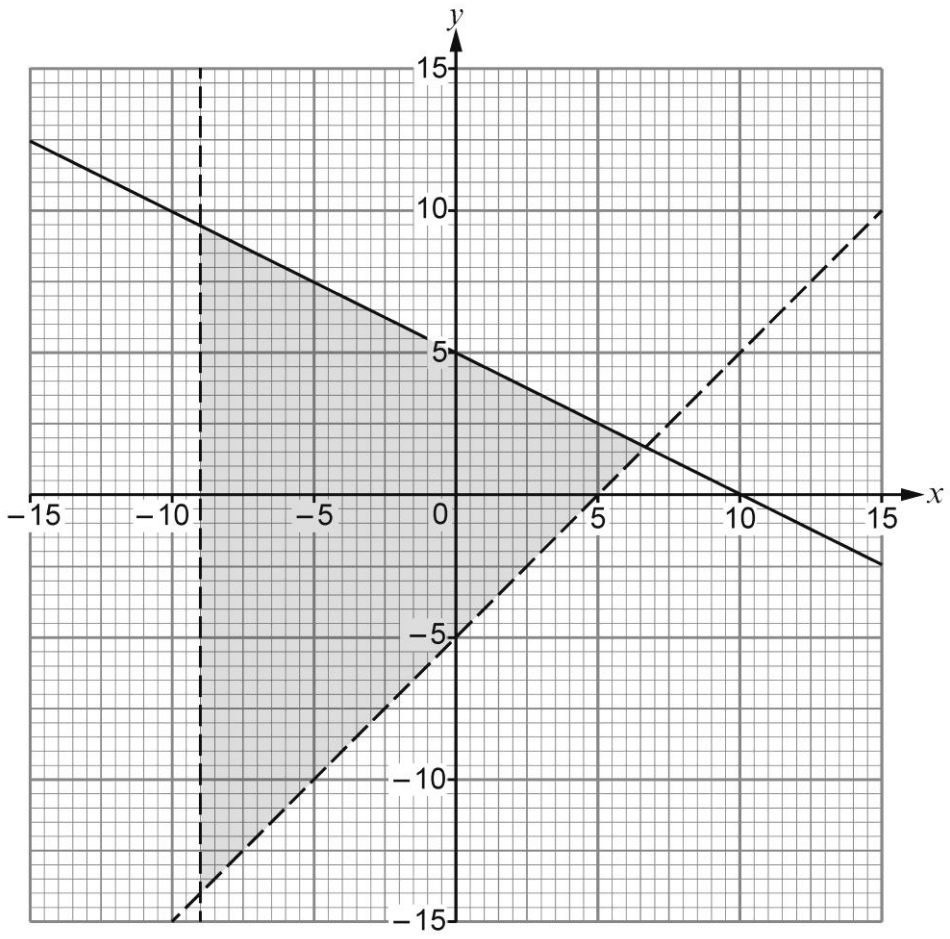
16. [3]

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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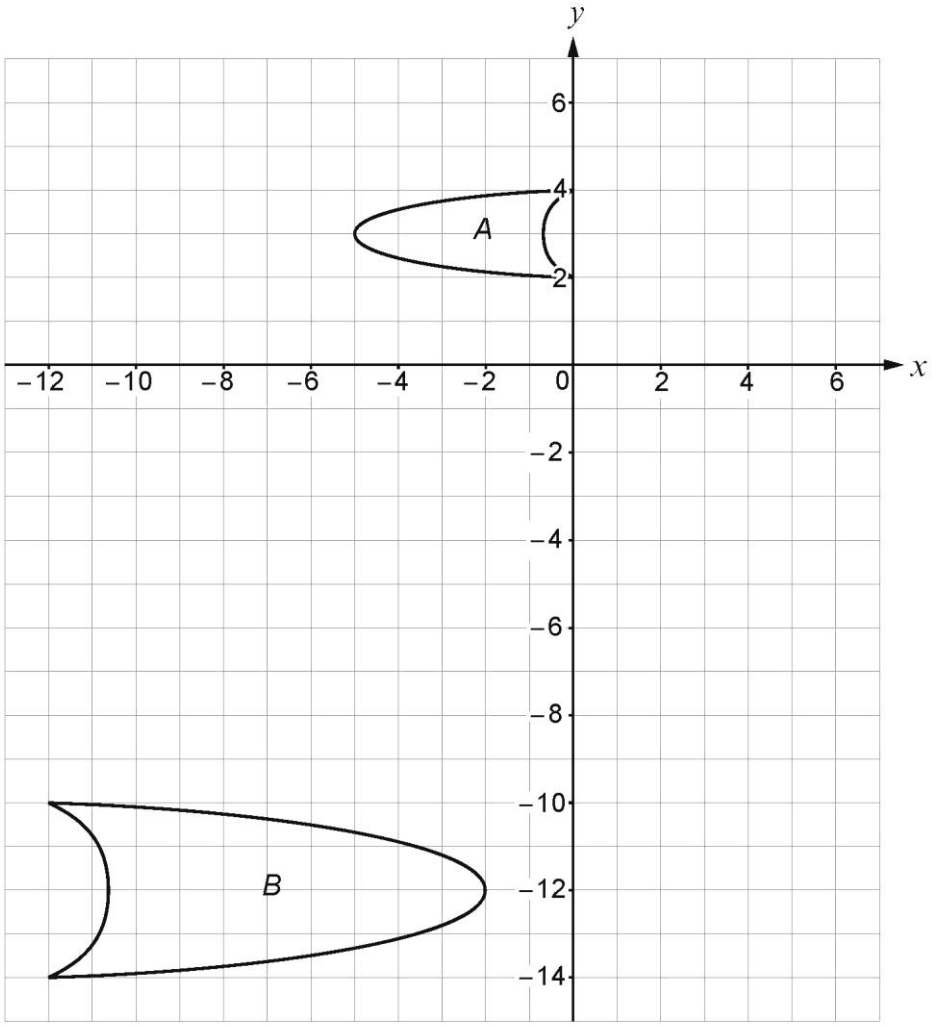
$x > -9$

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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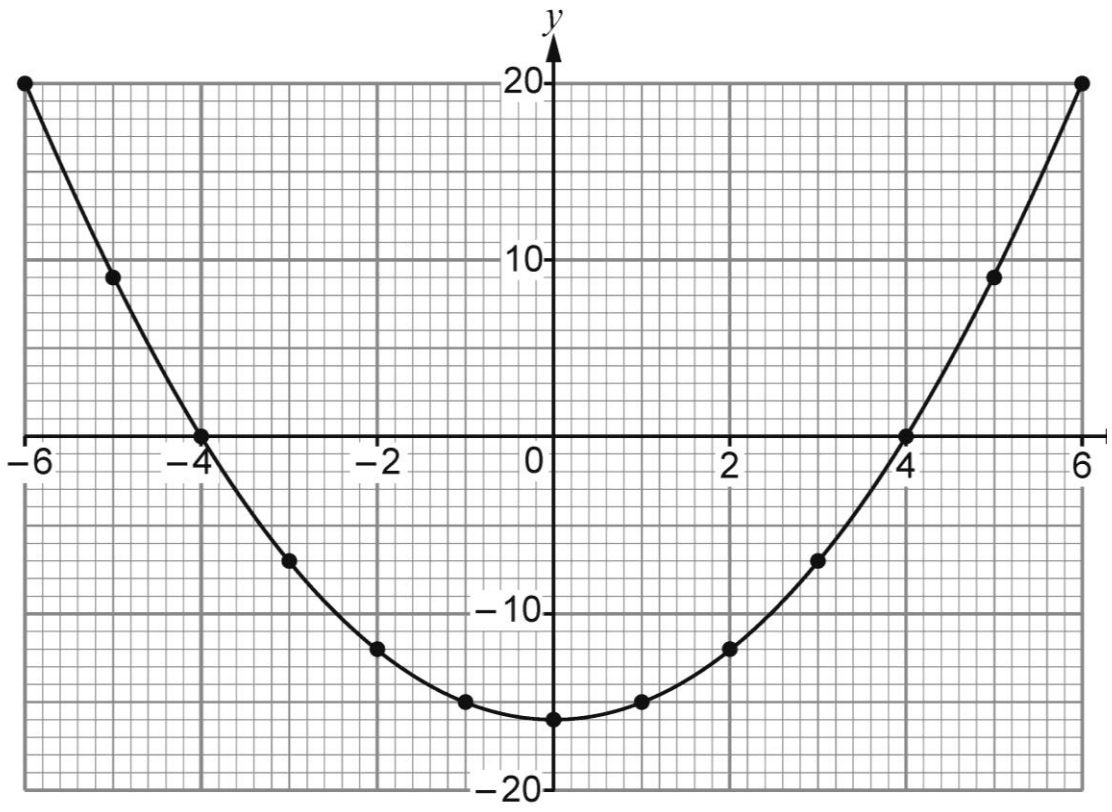
Scale factor is ……

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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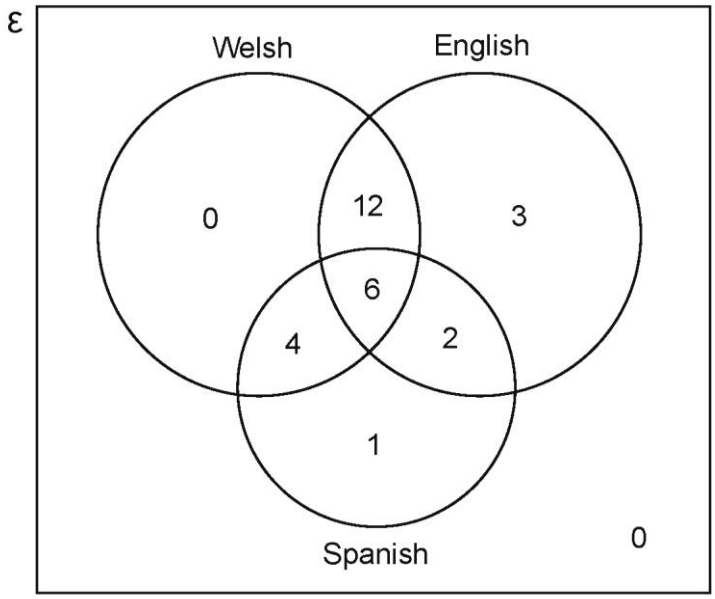
22. At an international climate conference, 28 students were asked what languages they speak. [3]

The results are shown in the Venn diagram below.



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

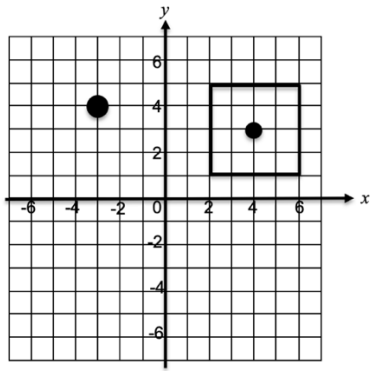
Examiner only

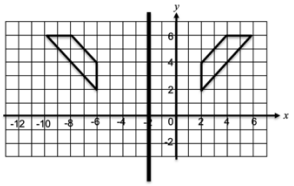
Question number	Additional page, if required. Write the question number(s) in the left-hand margin.
	…… ……

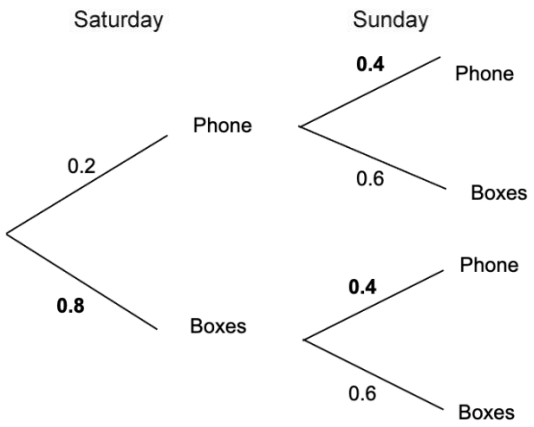
Examiner only

Mark Scheme

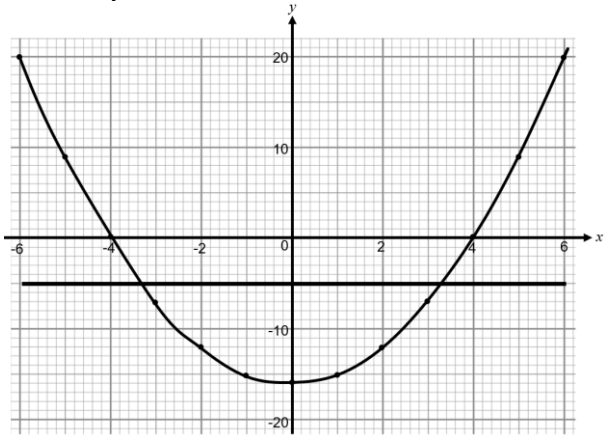
GCSE Mathematics and Numeracy Unit 2: Higher Tier SAMs	Mark	Comments
1. $13d - 5d = -31 - 9$ $8d = -40$ $d = -5$	B1 B1 B1	FT until 2nd error Mark final answer Allow an embedded answer If FT leads to a whole number answer, it must be shown as a whole number, otherwise accept a fraction
2. $\frac{21}{8} \times \frac{8}{3} - \frac{1}{8}$ $6\frac{7}{8}$	M2 A2	M1 for any one of the following: • $2\frac{5}{8} \div \frac{3}{8} = \frac{21}{8} \times \frac{8}{3}$ • $\frac{1}{2^3} = \frac{1}{8}$ A1 for any one of the following: • $\frac{21}{8} \times \frac{8}{3} = 7$ • final answer $\frac{55}{8}$ • 'their $\frac{21}{8} \times \frac{8}{3}$ ' $- \frac{1}{8}$ correctly evaluated and given as a mixed number
3. a = 42° b = 65° c = 115°	 B1 B1 B1	Answer spaces take precedence FT 180 °– 'their b' provided 'their b' $\neq$ 0°, 90° or 180°

4. (Probability of a black or white bead) 0.44 + 0.44 ÷ 2 or equivalent (Probability of a red bead) (1 – 0.44 – 0.44 ÷ 2) ÷ 2 or (1 – 0.66) ÷ 2 or 0.34 ÷ 2 or equivalent 0.17	M1 M2 A1	(= 0.66) FT 'their probability of a black or white bead', provided this ≠ 0, 0.44, or 1 Only allow missing brackets provided not contradicted in further working M1 for appropriate sight of either of the following (probability of a red or yellow bead): • 0.34 • 1 – 'their probability of a black or white bead' correctly evaluated CAO
Organisation and communication Writing	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means For W1, candidates will be expected to: • show all their working • use correct mathematical form in their working • use appropriate terminology, units, etc.
5(a) Point (-3, 4) indicated  	B1	Must be an unambiguously correct point Ignore any indication of a possible placement of the square

5(b) Reflection (in the line) $x = -2$	B2	'Reflection' and '$x = -2$' must be stated B1 for any one of the following: • reflection (in a vertical line) • the correct line of reflection indicated  • ($x =$) -2 • FT for 'their equation' in the form $x = k$ provided $k \neq 0$, from 'their vertical line' indicated on the grid
6. Lowest common multiple of $2 \times 5 \times 7 \times 8$ or 560 seen or implied Table completed correctly, or sight of correct number of boxes in working, e.g. Knives 40 boxes Forks 35 boxes Spoons 56 boxes	M2 A1	M1 for a method looking at factors or multiples, **e.g.** • sight of 2×7, 2×8 and 2×5 • sight of 2×7, 2^4 and 2×5 • sight of 2×7, $2 \times 2 \times 4$ and 2×5 • (14,) 28, 42, 56 and (16,) 32, 48, 64 and (10,) 20, 30, 40 • a common multiple, not LCM, e.g. 1120 Answers in the table take precedence If no marks, award SC1 for an answer with whole numbers of knives, forks and spoons in correct the ratio, e.g. 80 ; 70 : 112
7. $x + x - 23 + x - 23 - 5 > 100$ or equivalent $x > \frac{151}{3}$ or $x > 50\frac{1}{3}$ or $x > 50.3(\ldots)$ (Youngest Rhodri could be) 51 (years-old)	M2 A2 B1	M1 for sight of any one of the following: • $x + x - 23 + x - 23 - 5$ • $x + x - 23$ (+ …….) > 100 Possible FT from M1 for A1 only A1 for any one of the following: • $3x - 51 > 100$ • $3x > 151$ • a simplified inequality for 'their $x + x - 23$ (+ …….) > 100' FT 'their $x > \frac{151}{3}$ ' provided it is not a whole number No marks for trial and improvement or an unsupported answer

8(a) $\frac{9}{200}$ or equivalent	B2	Allow poor notation only if it leads to a correct answer, e.g. $\frac{4}{50} + \frac{0}{50} + \frac{3}{50} + \frac{2}{50}$ B1 for any one of the following: • proper fraction with numerator 9 • proper fraction with denominator 200 • sight of $\frac{4 + 0 + 3 + 2}{4 \times 50}$
8(b) $\frac{9}{200}$ × 5000 or equivalent 225	M1 A1	
9. 7.5	B3	Award B3 only if no inappropriate stages of working or compensating errors B2 for any one of the following: • $\frac{30}{4}$ • $\frac{30}{\text{'their } \sqrt[3]{8^2}'}$ approximated to 2 sig. fig. • $\frac{\text{'their } \sqrt[3]{27000}'}{4}$ approximated to 2 sig. fig. B1 for any one of the following: • $\sqrt[3]{27000} = 30$ • $\sqrt[3]{8^2} = 4$
10(a) Complete tree diagram  	B2	B1 for any one of the following: • 0.8 or equivalent on the boxes Saturday branch • 0.4 or equivalent on **both** the phone Sunday branches
10(b) 0.8 × 0.6 0.48 or equivalent	M1 A1	FT 0.8 × 'their lower branch 0.6' provided 0 < 'their lower branch 0.6 < 1 Mark final answer

11(a) 4100×0.08 (= 328 and) $41 \div \frac{1}{8}$ = 328	B2	Answer space takes precedence B1 for sight of any one of the following: • $4100 \times 0.08 = 328$ • $41 \div \frac{1}{8} = 328$ • at least 3 of the 6 evaluations correct
11(b) $8^{\frac{2}{3}}$ (= 4 and) $\frac{1}{0.25}$ = 4	B2	Answer space takes precedence B1 for sight of any one of the following: • $8^{\frac{2}{3}} = 4$ • $\frac{1}{0.25} = 4$ • at least 3 of the 6 values correct
12. $(x - 5)(x - 8)$ (=0) x = 5 with x = 8	B2 B1	B1 for any one of the following: • $(x + a)(x + b)$ (=0) where $ab = (+)40$ • $(x + c)(x + d)$ (=0) where $c + d = -13$ **Strict** FT from 'their pair of brackets'
13. (2312 ÷ 14 =) 165 remainder 2 or $165\frac{2}{14}$ or (*n*th term) $2312 - 14n$ or equivalent $2312 - 14 \times 165$ (= 2) or $2312 - 14 \times 166$ (= -12) (First number in the sequence <0 is) -12 166 (th term)	B1 B1 B1 B1	Allow (2312 ÷ 14 =) 165.(….) or 166 FT 'their (2298 + 14) ÷ 14' The award of B1 may also imply the award of the previous B1 CAO CAO

14(a) 77° AND a reason, e.g. the sum of the opposite angles in a cyclic quadrilateral is 180° ‘	B2	Allow 77° with ‘cyclic quadrilateral’ B1 for 77°
14(b) ($Y\hat{P}Q$ =) 20º	B2	Do not penalise missing unit (º) B1 for any one of the following: • ($Y\hat{P}Q$ =) 90º – 20º • $O\hat{P}Q$ = 70º • $O\hat{P}Y$= 90º
15. Method leading to a fraction, e.g. $100x$ = 42.4242… and x = 0.4242… with an attempt to subtract or equivalent OR sight of $99x$ = 42 $(x) = \frac{42}{99}$ or $\frac{14}{33}$ $\left(\left(\frac{7}{4\frac{1}{2}+2^6}\right)^{-1}=\right)$ $\frac{66}{7}$ $\left(\frac{42}{99}\times\frac{66}{7}\right.$ or $\left.\frac{14}{33}\times\frac{66}{7}=\right)$ 4	M1 A1 B1 B1	 ISW CAO
16. $y \leq -\frac{1}{2}x + 5$ and $y > x - 5$	B3	Accept equivalents for B3, B2 or B1 B2 for one of the following: • $y \leq -\frac{1}{2}x + 5$ • $y > x - 5$ • $y \ldots -\frac{1}{2}x + 5$ and $y \ldots x - 5$, where the inequalities have an **incorrect** symbol (<, >, ≥ , ≤, =) B1 for one of the following: • $y \ldots -\frac{1}{2}x + 5$ or $y \ldots x - 5$, where the inequality has an **incorrect** symbol, i.e. (<, >, ≥, ≤, =)
17. Scale factor -2 Centre of enlargement (-4, -2)	B1 B1	Answer space takes precedence Answer space takes precedence
18. Line $y = -5$ drawn  Solutions x = – 3.3 to – 3.4 with x = 3.3 to 3.4	B3 B2	The line must be of sufficient length to intersect the graph given at 2 points B2 for any one of the following: • line $y = -5$ drawn but of insufficient length to intersect at the 2 points • line required is $y = -5$ stated or implied • sight of $(x + 4)(x - 4) = -5$ or equivalent B1 for any one of the following: • $((x + 4)(x - 4) =)$ $x^2 - 16$ • $(x^2 - 11 =)$ $(x + 4)(x - 4) + 5$ or equivalent CAO, no FT B1 for either solution correct

19. $g^3h^3 = 27g^3 + 7$ or $g^3h^3 - 27g^3 = 7$ $g^3(h^3 - 27) = 7$ $g^3 = \frac{7}{h^3-27}$ $g = \sqrt[3]{\frac{7}{h^3-27}}$	 B1 B1 B1 B1	FT until 2nd error for equivalent level of difficulty. Cube No FT from $gh = 3g + \sqrt[3]{7}$ as this is 2 errors Isolating terms in g^3 and factorising Isolating g^3 Must not have '$\pm\sqrt[3]{}$'
20. $((\sqrt{75} - \sqrt{3})^2 =)$ $(5\sqrt{3} - \sqrt{3})^2$ or $(4\sqrt{3})^2$ 48	M2 A1	M1 for sight of $\sqrt{75}$ expressed as one of the following: • $\sqrt{25 \times 3}$ • $\sqrt{5 \times 5 \times 3}$ • $5\sqrt{3}$ CAO
20. Alternative method 1 $75 - \sqrt{75}\sqrt{3} - \sqrt{75}\sqrt{3} + 3$ *48*	*M2* *A1*	*May be shown in stages with $\sqrt{75}\sqrt{3}$ written as $\sqrt{225}$ or $\sqrt{5 \times 5 \times 3 \times 3}$* *M1 for any one of the following or with equivalents:* • *75 ….. + 3 provided 3 or 4 terms are given* • $75 - \sqrt{75}\sqrt{3} - \sqrt{75}\sqrt{3} + \cdots$ • $\ldots - \sqrt{75}\sqrt{3} - \sqrt{75}\sqrt{3} + 3$ *CAO*
20. Alternative method 2 $(\sqrt{3})^2(\sqrt{25} - 1)^2$ $3(5-1)^2$ *48*	*M1* *m1* *A1*	
21. $(4w^2 - 9 =)$ $(2w + 3)(2w - 3)$ $(8w^2 - 12w =)$ $4w(2w - 3)$ $\frac{2w+3}{4w}$	M1 M1 A1	Mark final answer **Strict** FT from 'their factorised expressions' provided either the numerator or denominator is correct, i.e. at least M1 previously awarded

22. (1 – P(no Sp, no Sp, no Sp)) $1 - \frac{12+3}{28} \times \frac{12+3-1}{27} \times \frac{12+3-2}{26}$ or $1 - \frac{15}{28} \times \frac{14}{27} \times \frac{13}{26}$ OR (P(1 Sp) + P(2 Sp) + P(3 Sp)) $3\left(\frac{13}{28} \times \frac{15}{27} \times \frac{14}{26} + \frac{13}{28} \times \frac{12}{27} \times \frac{15}{26}\right) + \frac{13}{28} \times \frac{12}{27} \times \frac{11}{26}$ $\frac{31}{36}$ or equivalent	M2 A1	M1 for sight of any one of the following: • (P(0 Sp)=) $\frac{15}{28} \times \frac{14}{27} \times \frac{13}{26}$ • (P(3 Sp)=) $\frac{13}{28} \times \frac{12}{27} \times \frac{11}{26}$ • (P(2 Sp)=) (3 ×) $\frac{13}{28} \times \frac{12}{27} \times \frac{15}{26}$ • (P(1 Sp,)=) (3 ×) $\frac{13}{28} \times \frac{15}{27} \times \frac{14}{26}$ ISW

How to read the mark scheme

- ‘M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
- ‘m’ marks are dependant method marks. They are only given if the relevant previous ‘M’ mark has been earned.
- ‘A' marks are given for a numerically correct stage, for a correct result or for an answer lying within a specified range. They are only given if the relevant M/m mark has been earned either explicitly or by inference from the correct answer.
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- ‘S’ marks are awarded for strategy
- ‘E’ marks are awarded for explanation
- ‘U’ marks are awarded for units
- ‘P’ marks are awarded for plotting points
- ‘C’ marks are awarded for drawing curves
- ‘OC’ marks are awarded for ‘organising and communicating’, a strand of OCW (organising, communicating and writing accurately)
- ‘W’ marks are awarded for ‘writing accurately’, a strand of OCW (organising, communicating and writing accurately)
- ‘SC’ marks are awards for special cases
- CAO: correct answer only
- ISW: ignore subsequent working
- FT: follow through

Assessment mapping

Q.	Topic	Max mark	AO1	AO2	AO3	Common Qn (FT)	Common marks (FT)	OCW
1	Solve linear equation with variable both sides	3	3			13	3	
2	Number machine with fractions and indices	4	4			14	4	
3	Parallel lines	3	3			15	3	
4	Probability problem, including use of 1 - P(a)	6			6			*
5	Line of reflection, anticlockwise rotation	3	1	2				
6	Wooden cutlery factor and LCM problem	3			3	16	3	
7	Family business age inequality	5		5		17	5	
8	Relative frequency of rotten oranges	4	4					
9	Estimation of calculation to 1 sig fig including cube root	3	3					
10	Tree diagram cycle to and from work	4	4			18	4	
11	Pairs of equal calculations	4	4					
12	Factorise then solve a quadratic equation	3	3					
13	Decreasing linear sequence to less than zero	4			4			
14	Circle theorems	4	4					
15	Recurring decimal and indices	4	4					
16	Describe an inequality region	3	3					
17	Negative enlargement	2	2					
18	Graph to solve a quadratic	5			5			
19	Change the subject, term twice and cube root	4	4					
20	Squaring a bracket containing difference with surds	3	3					
21	Simplify algebraic fraction including difference of 2 squares	3	3					
22	Venn diagram probability of language spoken by students	3		3				
		80	**52**	**10**	**18**		**22**	