

Surname	Centre Number	Candidate Number
Other Names		0



GCSE – NEW

3300U30-1

**MATHEMATICS
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER**

TUESDAY, 8 NOVEMBER 2016 – MORNING

1 hour 45 minutes



A16-3300U30-1

*Annotated
Answers & Helpful
hints inc.
marks how & where.*

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. 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 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.

In question 6, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	3	
3.	3	
4.	6	
5.	5	
6.	7	
7.	5	
8.	3	
9.	3	
10.	6	
11.	7	
12.	3	
13.	4	
14.	4	
15.	5	
16.	6	
17.	4	
Total	80	

13
16000000

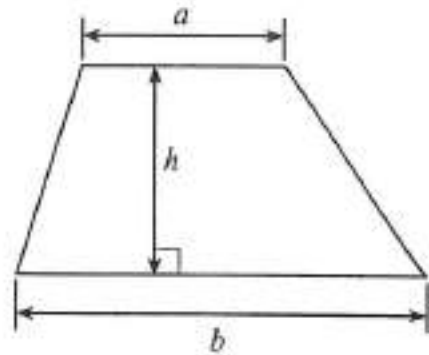


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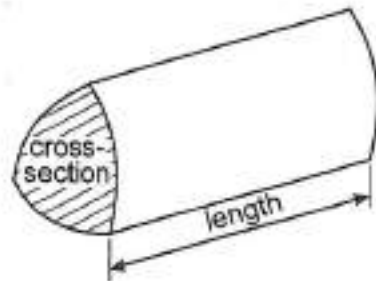
- ⓐ Black – actual answer
- ⓑ Red – Hints/Facts to recall
- ⓒ Blue – How marks are given
- ⓓ Green – Identifying the maths

Formula List – Intermediate Tier

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



Volume of prism = area of cross-section \times length



First couple of questions are easy to spot maths - like BOOTCAMP.
 Check for silly errors

Examiner only

1. Calculate each of the following.

(a) 0.4×0.7 ← think of $4 \times 7 = 28$ [1]
 $\therefore 0.4 \times 7 = 2.8$ $0.4 \times 0.7 = 0.28$

(b) $13.8 - 7.45$ ← Treat decimals like money calculations [1]

13.80 ← Put in extra zero's to balance out the sum.
 7.45
 $\hline 6.35$

(c) $3^3 - 2^4$ ← Powers indicate the number of values multiplied [2]

↓
 $3 \times 3 \times 3 - 2 \times 2 \times 2 \times 2$
 $27 - 16 = 11$

2 marks
 show 2 steps
 i.e. workings
 [2] ✓

(d) $\frac{9}{10} - \frac{3}{5}$ ← Only +/- fractions if the number on the bottom are the same.

$\frac{9}{10} - \frac{6}{10} = \frac{3}{10}$

↖ No. on bottom stays the same just +/- top values.
 $\frac{3 \times 2}{5 \times 2} = \frac{6}{10}$



You need to work out the correct answers

Don't just guess you lose a mark for everyone

to show True or false

incorrect

Examiner only

2. Circle either TRUE or FALSE for each of the following statements.

[3]

20% of 70 is the same as 70% of 20. <i>Find 10% first (=10)</i>	<input checked="" type="radio"/> TRUE	<input type="radio"/> FALSE
$\frac{1}{2}$ of $\frac{1}{8}$ is the same as $\frac{1}{8}$ of $\frac{1}{2}$ <i>of is X action</i>	<input checked="" type="radio"/> TRUE	<input type="radio"/> FALSE
A number is halved. $\div 2$ The answer is halved, and then this answer is halved again. This gives the same answer as dividing the original number by 6.	<input type="radio"/> TRUE	<input checked="" type="radio"/> FALSE
Dividing a number by 15 is the same as first dividing by 10 and then dividing the answer by 5.	<input type="radio"/> TRUE	<input checked="" type="radio"/> FALSE
Multiplying a number by 2.5 is the same as first multiplying by 10 and then dividing the answer by 4. <i>10 \div 4 is 2.5</i>	<input checked="" type="radio"/> TRUE	<input type="radio"/> FALSE

Space for working:

a) $20\% \text{ of } 70 = 14$ $70\% \text{ of } 20 = 14$

b) $\frac{1}{2} \times \frac{1}{8} = \frac{1}{16}$ $\frac{1}{8} \times \frac{1}{2} = \frac{1}{16}$

c) Test 30 $\rightarrow \frac{1}{2}$ of 30 = 15 $\frac{1}{2}$ of 15 = 7.5
 $30 \div 6 = 5$ not same

d) Test with 60 $60 \div 15 = 4$ not same
60 $60 \div 10 = 6$ $6 \div 5 = 1.2$

e) $10 \times 2.5 = 25$
 $10 \times 10 = 100$ $100 \div 4 = 25$ same



Algebra - Create an equation by representing values with letters

Examiner only

3. A shop has 31 plant pots. Some are blue, some are yellow and the rest are red. There are five more blue pots than yellow pots. There are four times as many blue pots as there are red pots.

Calculate how many pots there are of each colour.

Blue = x pots Yellow = $x - 5$ Red = $\frac{x}{4}$

$$31 = x + x - 5 + \frac{x}{4}$$

$$31 = 2x - 5 + \frac{x}{4}$$

$$\times 4 \quad \times 4 \quad \times 4 \quad \times 4$$

$$124 = 8x - 20 + x$$

$$124 = 9x - 20$$

$$\frac{124 + 20}{9} = x \quad 16 = x$$

reverse process to find x

Blue 16 Yellow $16 - 5 = 11$ Red $\frac{16}{4} = 4$

4. (a) Write down the next two numbers in the following sequence.

33 $\xrightarrow{-7}$ 26 $\xrightarrow{-7}$ 19 $\xrightarrow{-7}$ 12 $\xrightarrow{-7}$ 5 $\xrightarrow{-7}$ -2

Work out the pattern + or - away \times or \div

No answer just less written down

- (b) Simplify the expression $10g - 5f - 3g + 3f$

$$10g - 3g - 5f + 3f$$

$$7g - 2f$$

- (c) Using the formula $2T = M + 3K$, find the value of K when $T = 11$ and $M = 4$.

Substitution

substitute any values for the letters

$$2(11) = 4 + 3K$$

$$22 = 4 + 3K$$

$$22 - 4 = 3K$$

$$\frac{18}{3} = K$$

$$6 = K$$

'Unknowns' try to write an equation to solve ie use algebra

OR You can just try No's + see what fits.

At least 2 method/ workings out marks

2 correct answers 1 mark each

2 terms g and f.

1 method mark

1 answer mark.

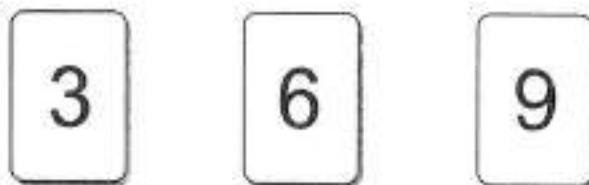


Spot the POSSIBILITY SPACE & Probability

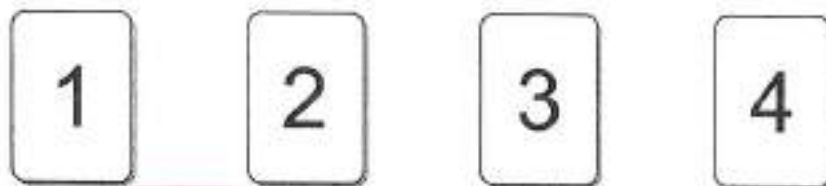
6

Examiner only

5. Three red cards have the following numbers written on them.



Four green cards have the following numbers written on them.



In a game, the cards are turned face down. A player chooses one red card and one green card at random. The player's score is the sum of the two numbers.

Identify the calculation needed to complete the table [1]

(a) Complete the following table.

		Score			
Red card	9	9+1 <u>10</u>	<u>11</u>	9+3 <u>12</u>	9+4 <u>13</u>
	6	6+1 <u>7</u>	8	6+3 <u>9</u>	6+4 <u>10</u>
	3	4	5	6	7
		1	2	3	4
		Green card			

Probability is always written as a

FRACTION or a DECIMAL

never a % or ratio or in words

(b) A player wins a prize if the score is **more than 9**. Safira plays the game once. What is the probability that she wins a prize?

$$\frac{4}{12}$$

← No. winning scores
← Total No. outcomes

[2] I mark for numerator and denominator in the fraction

(c) 60 people play the game once. Approximately how many people would you expect to win a prize?

$$60 \times \frac{4}{12} = 20 \text{ people}$$

← Go up in a pattern

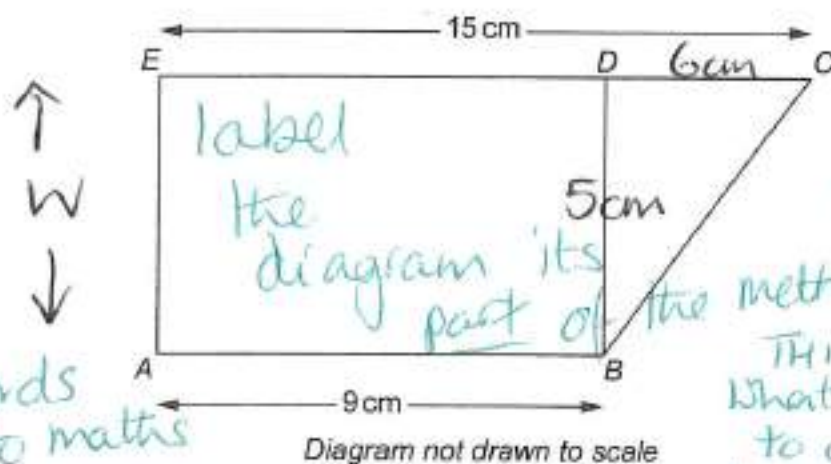
OR

$\frac{4}{12}$	$\frac{8}{24}$	$\frac{12}{36}$	$\frac{16}{48}$	$\frac{20}{60}$
----------------	----------------	-----------------	-----------------	-----------------



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

A right-angled triangle BCD is joined to a rectangle $ABDE$, as shown below.



Key words
link to maths

THINK
What do I need
to calculate

The area of the rectangle is 45 cm^2 .

Calculate the area of the right-angled triangle.
You must show your working.

$$\text{Area Rectangle} = L \times W$$

$$\text{Area Triangle} = \frac{1}{2} \times B \times H$$

Labeling/explaining what you are doing 1 mark

$$\text{Area Rectangle} \Rightarrow 45 = 9 \times \text{width}$$

$$\frac{45}{9} = \text{width} \quad \underline{5 \text{ cm} = \text{width}}$$

(width is also
height of triangle).

$$\text{Base } \Delta = 15 \text{ cm} - 9 \text{ cm} = 6 \text{ cm}$$

$$\text{Height } \Delta = 5 \text{ cm}$$

$$\text{Area } \Delta = \frac{1}{2} \times 6 \times 5$$

$$\text{Area } \Delta = 15 \text{ cm}^2$$

Units
1 mark

Answer
1 mark

2 marks
for explaining
units, accuracy
& clear workings.

5 + 2 OCW
units
labels
clear
+ maths accuracy
+ method marks

Clear steps
upto 2 marks

workings 1 mark



Find a number answer 8

Examiner only

7. Solve each of the following equations.

(a) $\frac{w}{5} = 10$

$w = 10 \times 5$ $w = 50$

←
opposite process

[1]

answer only marks

(b) $\frac{42}{x} = 7$

←
reverse question think "what divides into 42 to give 7"

$x = 6$

[1]

(c) $13y - 5 = 9y + 27$

As unknown's on both sides
use balance to collect all on one side
then reverse action process.

[3]

expect to see 2 steps & answer.

$$\begin{array}{r} 13y - 5 = 9y + 27 \\ -9y \qquad -9y \end{array}$$

$$4y - 5 = 27$$

←
reverse process

$$\frac{27 + 5}{4} = y$$

$$\frac{32}{4} = y \qquad \underline{\underline{8 = y}}$$



Recognise that this is AVERAGES

Mean, median, mode & range

Examiner only

9. Write down five numbers that satisfy all of the following conditions:

- 1 2 3 4 5 6 7 8 9
- They are all between 1 and 9 inclusive. ← write down all possible results
 - They have a median value of 6. ← median is middle value
 - They have a range of 7. ← highest - lowest = range
 - Their mean is 5.

Calculate the total

$$\left. \begin{array}{l} 9 - 2 = 7 \\ 8 - 1 = 7 \end{array} \right\} \text{only possible combinations}$$

(3) 1 mark for method 2 for answers

$$\text{Mean} = 5 = \frac{\text{Total}}{\text{How many}} \Rightarrow 5 = \frac{\text{Total}}{5} \quad 25 = \text{Total}$$

1	3	6	7	8
---	---	---	---	---

Now see which no's could fit

$$2 + \square + 6 + \square + 9 = 25$$

missing No's = 8 not enough to fill the gaps

$$1 + \square + 6 + \square + 8 = 25$$

missing No's = 10

possible to have 1, 2, 6, 8, 8
or 1, 3, 6, 7, 8

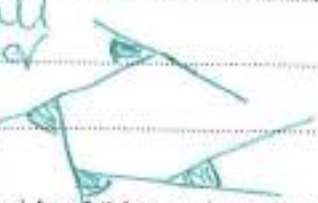


Polygon is a general shape with straight sides
 regular is all sides are equal.

10. A regular polygon has exterior angles of 45° .

(a) How many sides does this polygon have?

Sum of all the exterior angles = 360°
 $360^\circ \div 45^\circ = 8$



Fact: all polygons exterior angle sum = 360°
 ie 8 sides

Examiner only

(12)
 Method & answer marks

(b) Each side of this regular polygon is 7 cm.
 A sketch of two sides, AB and BC, of the polygon is shown below.

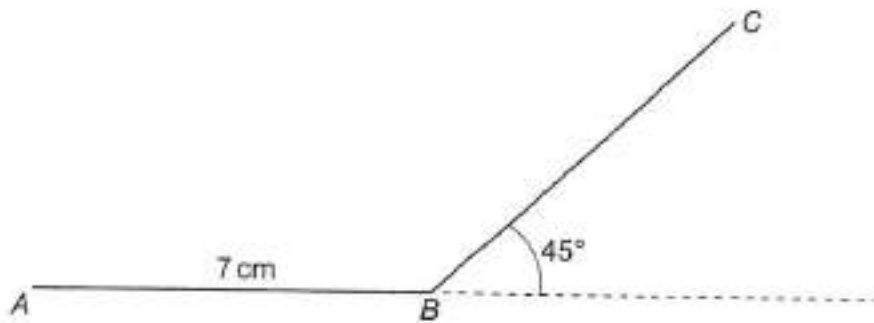
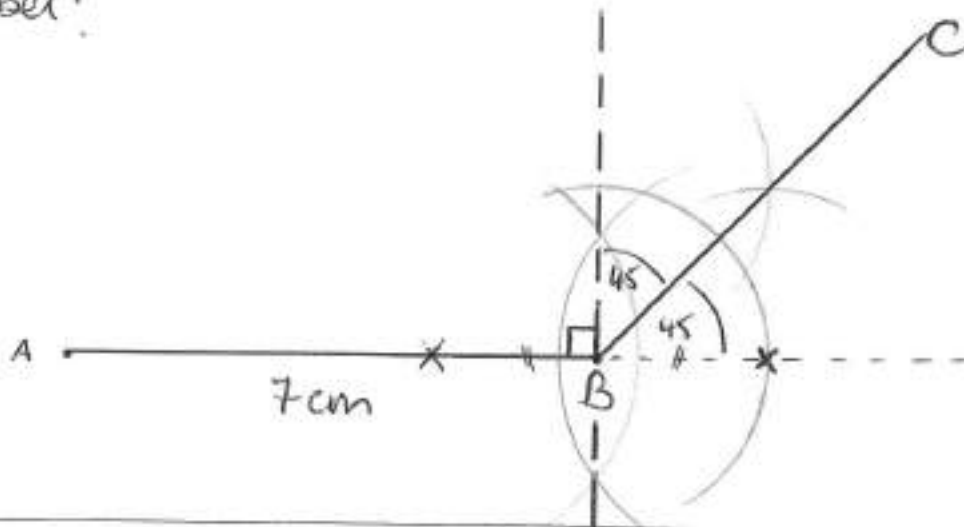


Diagram not drawn to scale

Using only a ruler and a pair of compasses, construct an accurate drawing that shows these two sides of the polygon.
 The point A has been given.
You must show your construction arcs.

must show construction marks to gain marks [4]

Measure the 7cm 1st → 1 mark
 Draw a 90° at B then bisect it 3 more marks.
 Label!



If it has an x^2 it looks like



12 Quadratic graph

Examiner only
answers only

11. (a) The table below shows some of the values of $y = 2x^2 - 5x - 1$ for values of x from -2 to 4.

Complete the table by finding the value of y for $x = -1$ and for $x = 2$.

Substitute for x into the eqn.

x	-2	-1	0	1	2	3	4
$y = 2x^2 - 5x - 1$	17	6	-1	-4	-3	2	11

$y = 2(-1)^2 - 5(-1) - 1 \rightarrow 2 + 5 - 1 = 6$

$y = 2(2)^2 - 5(2) - 1 \rightarrow 8 - 10 - 1 = -3$

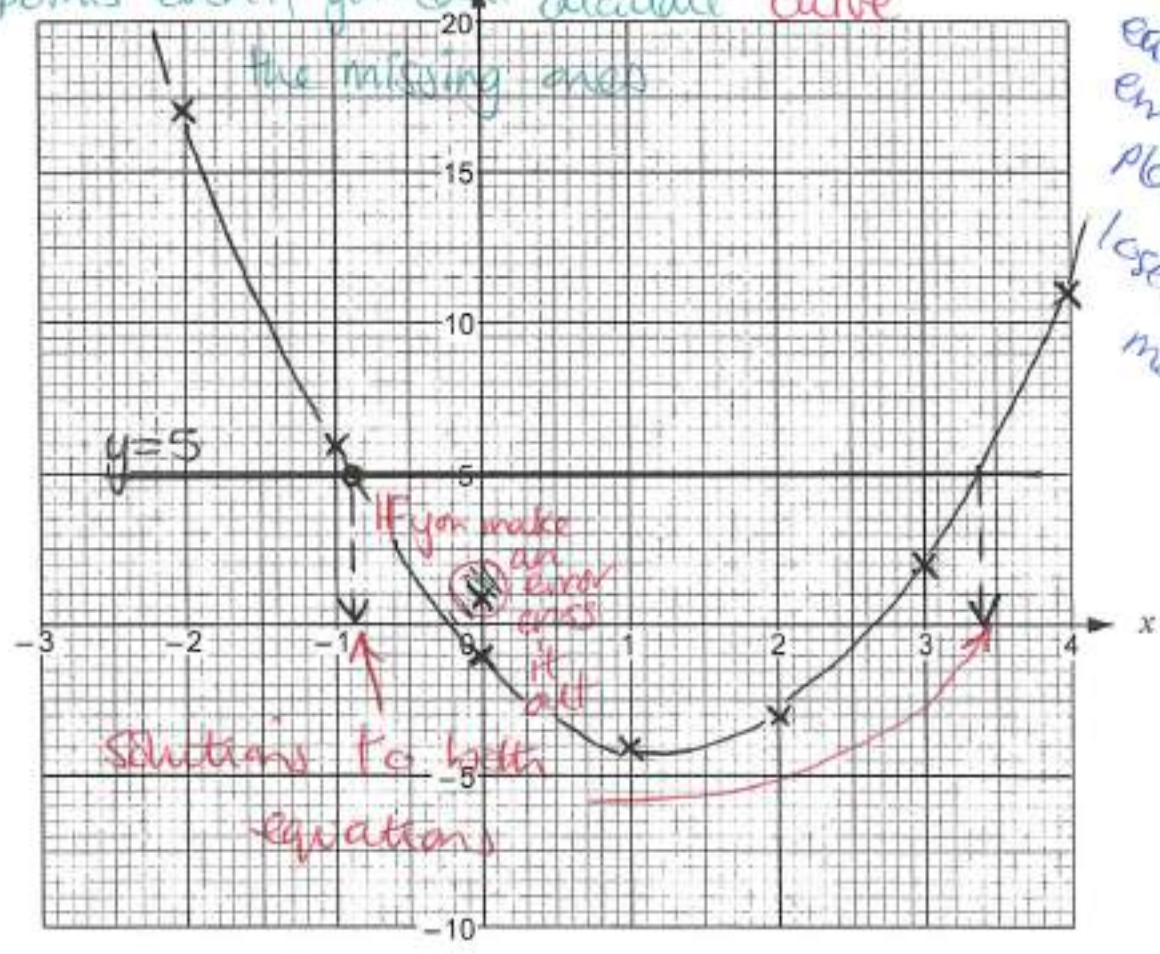
Plot all the points as words

First $x \rightarrow$ then $y \uparrow$

(b) On the graph paper below, draw the graph of $y = 2x^2 - 5x - 1$ for values of x from -2 to 4.

You can plot the other points even if you can't calculate

Join up all points as a curve



$x = \text{number}$ \updownarrow vertical line

- (c) Draw the line $y = 5$ on the graph paper.

$y = \text{number}$ \longleftrightarrow horizontal line

Write down the values of x where the line $y = 5$ cuts the curve $y = 2x^2 - 5x - 1$.
Give your answers correct to 1 decimal place.

Examiner only

check for accuracy as these are easy marks to lose
Values of x are -0.9 and 3.4

[2]

correct answers

- (d) Circle the equation below whose solutions are the values you have given in (c).

[1]

$$2x^2 - 5x - 1 = 0$$

$$2x^2 - 5x - 6 = 0$$

$$2x^2 - 5x - 5 = 0$$

$$2x^2 - x - 1 = 0$$

$$2x^2 - 5x + 4 = 0$$

$$y = 2x^2 - 5x - 1$$

$$y = 5 \text{ also}$$

Put both eq^{ns} together, rearrange & simplify

$$2x^2 - 5x - 1 = 5$$

$$2x^2 - 5x - 1 - 5 = 0$$

$$2x^2 - 5x - 6 = 0$$



12. A fair six-sided dice and a fair coin are thrown together once.

an experiment
links to
PROBABILITY

Circle the correct answer for each of the following statements.

(a) The number of possible results outcomes is

2

6

8

12

24.

[1]

(b) The probability of getting a 4 on the dice and a tail on the coin is

 $\frac{1}{8}$ $\frac{1}{12}$ $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{24}$.

[1]

(c) The probability of getting a **multiple of 3** on the dice and a **head** on the coin is

 $\frac{1}{8}$ $\frac{1}{12}$ $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{24}$.

[1]

Space for working:

a) 1H 2H 3H 4H 5H 6H

1T 2T 3T 4T 5T 6T

12 combinations

i.e. 12 outcomes (results)

work out each
answer - Don't just
guess.

b) Look at outcomes above there is one 4 and
a tail out of 12 $\frac{1}{12}$

c) Multiples of 3 are 3, 6

3H 6H 2 choices out of 12

$$\frac{2}{12} \div 2 = \frac{1}{6}$$

↑ This answer isn't
there so cancel down.



13. (a) Make m the subject of the formula $y = 6m + 7$.

rearrange so its $m = \text{something}$
reverse process

$$\frac{y-7}{6} = m$$

ALGEBRA
rearranging

[2]

1 method
mark
1 answer

- (b) Factorise $6x^2 - 12x$.
Take out the common factors. Break the terms down first

$$6 \times x \times x \quad 2 \times 6 \times x \quad 6x(x-2)$$

common factors
what's left.

[2]

1 method
+ full
answer
1 mark each

14. Find, in standard form, the value of each of the following.

(a) $\frac{7.5 \times 10^6}{5000}$

basic calculation but
using $\times 10 \times 10$ or $\div 10 \div 10$ etc

$$7.5 \times 10^6 \rightarrow 7.5 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 7500000$$

$$\frac{7500000}{5000} = 7500 = 1500 = 1.5 \times 10^3$$

cross out zero's on top/bottom to
simplify
back in standard form

(b) $(2.3 \times 10^3) + (6.4 \times 10^4)$

change to ordinary numbers
first.

$$2.3 \times 10 \times 10 \times 10 + 6.4 \times 10 \times 10 \times 10 \times 10$$

$$2300 + 64000 = 66300$$

$$= 6.63 \times 10^4$$

Don't forget to change
answer back into
standard form.

[2]

1 mark
for
methods
1 for answer



15. Each side of a square is of length $(2x + 3y)$ cm.
The perimeter of the square is 62 cm.

Perimeter + sides of square



$(2x + 3y)$ cm

8 sided shape all with equal sides

- Each side of a regular octagon is of length $(x + 2y)$ cm.
The perimeter of the octagon is 72 cm.

Perimeter is + sides up



$(x + 2y)$ cm

2 statement with algebra indicate create a

Use an algebraic method to find the value of x and the value of y .

pair of
simultaneous
equations

(5)

Square $62 = 4(2x + 3y)$

$$62 = 8x + 12y$$

Octagon $72 = 8(x + 2y)$

$$72 = 8x + 16y$$

Simultaneous eq^{ns}

$$72 = 8x + 16y$$

$$62 = 8x + 12y -$$

Eliminate x terms by subtracting

$$10 = 4y$$

Solve $\frac{10}{4} = 2.5 = y$

Substitute $y = 2.5$ into one of the eq^{ns}

$$72 = 8x + 16(2.5)$$

$$72 = 8x + 40$$

$$32 = 8x$$

$$4 = x$$

$$62 = 8(4) + 12(2.5)$$

$$\frac{32}{8}$$

$$x = 4$$

$$y = 2.5$$

$$62 = 32 + 30$$

✓ True

3 method
at least 1 for
creating the
eq^{ns} the
for correct
answers



This is a tree diagram
so links to probability

Examiner only

16. Alwyn often drives from Bangor to Cardiff.
He always chooses one of two routes for these journeys.
He either travels through Rhayader or through Hereford.
The probability that he travels through Rhayader is 0.7.

• $P(A \text{ and } B) = A \times B$
 $P(A \text{ or } B) = A + B$

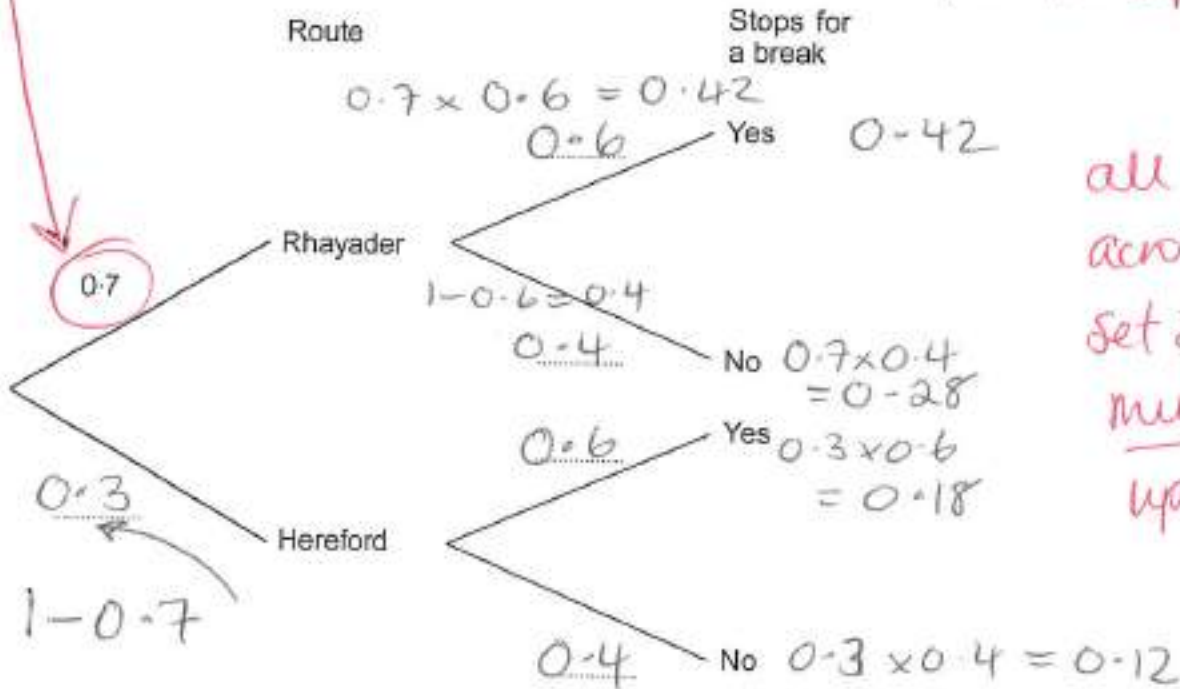
Sometimes he decides to stop for a break during his journey.
His decision is independent of the route he takes.

The probability that he travels through Rhayader and stops for a break is 0.42.

(a) Complete the following tree diagram.

This is the end probability of A and B only
convert answers in tree diagram [4]

ie $0.7 \times \square = 0.42$
THINK $7 \times \square = 42$ to help.



all probability across a set of branches must add up to one

(b) Calculate the probability that Alwyn travels through Hereford but does not stop for a break. [2]

Hereford and no
 $0.3 \times 0.4 = 0.12$

Method 1
answer 1



17. William has n marbles.

Lois had 4 times as many marbles as William, but she has now lost 23 of them.

Lois still has more marbles than William.

Write down an inequality in terms of n to show the above information.

Use your inequality to find the least number of marbles that William may have.

Write any algebra to represent the statements

William has 'n' marbles

Lois has $4 \times n - 23$

she still has more than

Lois $>$ William

$4n - 23 > n$

Solve by collecting all the 'n's together

$$4n - 23 - n > 0$$

$$3n - 23 > 0$$

reverse process

$$n > \frac{23}{3}$$

$$n > 7.6$$

i.e. n must be more than 7.6 so

END OF PAPER

it could be

8, 9, 10, 11 etc

$n = 8$ is the least value it (smallest) could be.

Statement of unknowns links to algebra

[4]

I mark for creating the algebra

she lost 23 of them
I mark for solving the inequality for the final answer.

$>$ more than
 $<$ less than

ie solve it like an eqn.

