Surname	Centre Number	Candidate Number
Other Names		0

GCSE

3300U40-1

A17-3300U40-1

MATHEMATICS
UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER

MONDAY, 13 NOVEMBER 2017 – MORNING

1 hour 45 minutes

ADDITIONAL MATERIALS

A calculator will be required for 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. Question numbers must be given for all work written on the continuation page.

Take π as 3·14 or use the π button on your calculator.

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 **8**, 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.	8	
2.	4	
3.	5	
4.	3	
5.	3	
6.	5	
7.	3	
8.	7	
9.	6	
10.	3	
11.	4	
12.	8	
13.	5	
14.	5	
15.	6	
16.	5	
Total	80	

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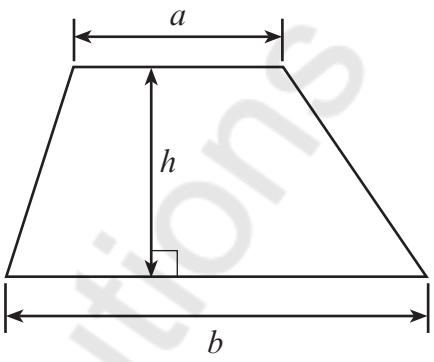
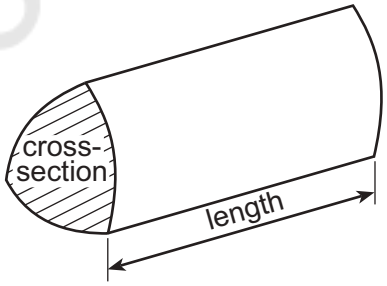
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



Examiner only

1. *(a)* Calculate 8% of £3.25. [3]

8% of 3·25

$\frac{8}{100} \times 3{\cdot}25 =$ £0·26

£0·26 or 26p

(b) Evaluate $0{\cdot}65 \times 280 - \frac{2}{9}$ of 513. [3]

P.
E→
M
D
A
S

B
O→
D
M
A
S

$0{\cdot}65 \times 280 - \frac{2}{9}$ of 513

$0{\cdot}65 \times 280 - \frac{2}{9} \times 513$

$0{\cdot}65 \times 280 - 114 = 182 - 114 = 68$

(c) Calculate $3{\cdot}5^2 - \sqrt{8{\cdot}6}$.

$x^2 = x \times x$

Give your answer correct to 2 decimal places. [2]

$3{\cdot}5^2 - \sqrt{8{\cdot}6}$

$3{\cdot}5 \times 3{\cdot}5 - \sqrt{8{\cdot}6}$

$12{\cdot}25 - 2{\cdot}933$

$9{\cdot}317$

$9{\cdot}31^{+} = 9{\cdot}32$

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03

Examiner only

2. *(a)* What is the difference between the following times?

'07:30 on 1st November 2017' and '13:20 on 3rd November 2017'

Give your answer in days, hours and minutes. [2]

07:30 1st Nov 2017 13:20 3rd Nov 2017

07:30 2nd Nov 2017

07:30 3rd Nov 2017

08:30 → 9:30 → 10:30 → 11:30 → 12:30 → 13:00 → 13:20

24 hrs + 24 hours + 1hr + 1hr + 1hr + 1hr + 1hr + 30mins + 20mins

2 days 5 hours 50 minutes

(b) Divide 16 hours 20 minutes by 5.

Give your answer in hours and minutes. [2]

16hours 20mins by 5

We know that 1hr = 60mins

16hrs = 16x60 = 960mins

16hrs 20mins = 960 + 20 = 980mins

980mins ÷ 5 = 196mins

3 hours 16 minutes

196 − 60 − 60 − 60 − 16

60mins + 60mins + 60mins + 16mins

3hrs 16 mins

Examiner only

3. *(a)*

11	23	5	9	18	20	

A number is to be written on the blank card.

The mode and the median of all seven numbers are both the same.

Find one possible number that can be written on the blank card. [1]

mode = median

Median

5 9 11 11 18 20 23

Number on card 11

(b) One extra number is added to the following list of three numbers.

6	8	13

The mean of the new list of four numbers is 1 less than the mean of the original three numbers

What number was added to the list? [4]

6, 8, 13, x

mean of orginal numbers = $\frac{6+8+13}{3} = 9$

mean of orginal number = 9

mean of new list is 9 − 1 = 8

mean of new list = $\frac{6+8+13+x}{4}$

$8 = \frac{27+x}{4}$

Number added 5

$8 \times 4 = (27+x) \times 1$

$32 = 27 + x$

$-27 \quad -27$

$5 = x$

$x = 5$

Examiner only

4. *(a)* How would the direction **due west** be written as a three-figure bearing?
Circle your answer. [1]

360° 180° 090° 270° 000°

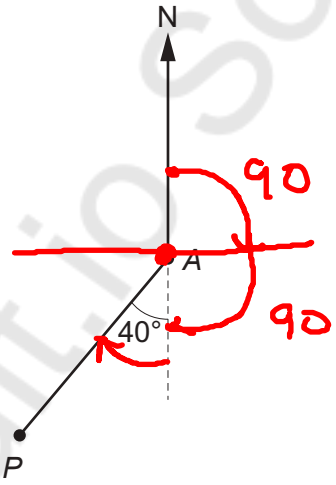
(b) There are 360° in a full turn.

A pointer facing **due south** is spun clockwise through $3\frac{3}{4}$ full turns.

In which direction will the pointer now face?
Circle your answer. [1]

north south west east none of these directions

(c)



What is the bearing of point *P* from point *A*?
Circle your answer. [1]

220° 040° 140° 320° 230°

Examiner only

5. Calculate the area of the trapezium shown below.
You must give the units of your answer. [3]

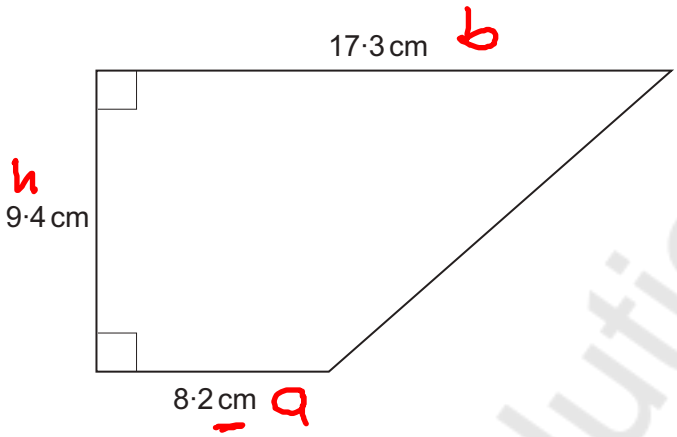
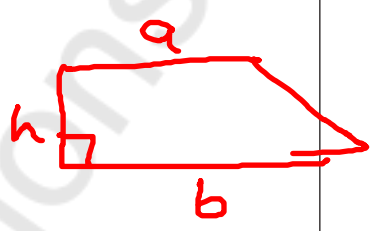


Diagram not drawn to scale



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

Area $= \frac{1}{2}(8.2+17.3) \times 9.4$

Area $= \frac{1}{2} \times 25.5 \times 9.4$

Area $= 119.85\ cm^2$

Examiner only

6. *(a)* Express 54 as a percentage of 129.
Give your answer to the nearest whole number. [3]

$\frac{54}{129} \times 100$

41.86%

42%

42%

(b) Share 25·8 kg in the ratio 5 : 1 [2]

5 : 1

25.8kg

For ratio 5:

$\frac{5}{6} \times 25.8 = 21.5\text{kg}$ *

21.5 kg and 4.3 kg

For ratio 1:

$\frac{1}{6} \times 25.8 = 4.3\text{kg}$ *

Examiner only

7. The following cards spell out the name Ystradgynlais.

Y	S	T	R	A	D	G	Y	N	L	A	I	S

In an experiment, the cards are turned face down and rearranged.
A card is selected at random and the letter on the card is recorded.

The experiment is carried out 325 times.

How many times would you expect the letter **Y** to be recorded? [3]

Total experiment is 325 times

Pr(Y being recorded) = number of time Y occurs / Total sample space

Pr(Y being recorded) = $\frac{2}{13}$

Y would be recorded = $\frac{2}{13} \times 325$

Y is recorded 50 times

Examiner only

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

AB is the diameter of a circle, centre *O*, with radius *OA* = 4·2 cm.
ABCD is a square.

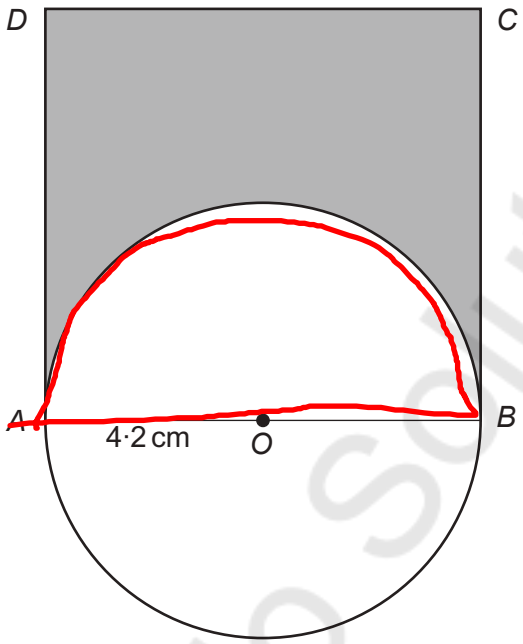


Diagram not drawn to scale

Calculate the area of the shaded region.
You must show all your working. [5 + 2 OCW]

Area of circle = πr^2

Area of semicircle = $\frac{\pi r^2}{2}$

OA = OB = 4·2cm [Both are radius of circle

AB = AO + OB = 4·2 + 4·2 = 8·4cm

Area of the shaded part = Area of the square − Area of the semicircle

Area of a square = s^2 = $8·4^2$ = 70·56cm²

Area of semicircle = $\frac{\pi r^2}{2}$ = $\frac{3·14 \times 4·2^2}{2}$

Area of semi-circle = 27·69 cm²

Area of shaded part = 70·56 − 27·65

= 42·87 cm²

Examiner only

9. *ABC* is an isosceles triangle with *AB* = *AC*.

Two sides equal

Two angles equal

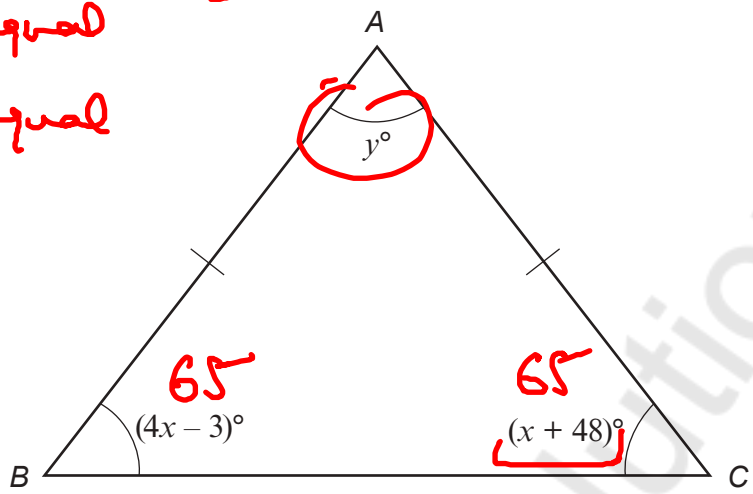


Diagram not drawn to scale

Calculate the value of *y*. [6]

$\angle B = \angle C$ [isosceles triangle]

$4x - 3 = x + 48$

$4x - x = 48 + 3$

$3x = 51$

$x = \frac{51}{3} = 17°$

$\angle C = x + 48$

$\angle C = 17 + 48$

$\angle C = 65$

$\angle B = 65$

$\angle A + \angle B + \angle C = 180$ [sum of angle in a triangle]

$y + 65 + 65 = 180$

$y + 130 = 180$

$-130 \quad -130$

$y = 50°$

$a^m \times a^n = a^{m+n}$

Examiner only

10. Simplify each of the following and circle the correct answer in each case.

(a) $6p^6 \times 3p^3$ $6p^6 \times 3p^3 = 18p^6 \times p^3 = 18p^{6+3}$ [1]

$9p^9$ $9p^{18}$ $18p^{18}$ $18p^2$ $18p^9$

(b) $3{\cdot}4g^8 \div 13{\cdot}6g^2$ [1]

$\frac{g^4}{4}$ $\frac{g^6}{4}$ $4g^4$ $4g^6$ $0{\cdot}4g^6$

(c) $\frac{m^3 \times m^6}{m^9} = \frac{m^{3+6}}{m^9} = \frac{m^9}{m^9} = m^{9-9} = m^0 = 1$ [1]

1 m m^2 m^4 4

$\frac{a^m}{a^n} = a^{m-n}$

$\frac{3{\cdot}4g^8}{13{\cdot}6g^2} \times \frac{10}{10} = \frac{34g^8}{136g^2} = \frac{1}{4}g^{8-2} = \frac{g^6}{4}$

Examiner only

11. A solution of the equation

$$x^3 + 2x = 91$$

lies between 4 and 5.

Use the method of trial and improvement to find this solution correct to 1 decimal place.
You must show all your working. [4]

$x^3 + 2x = 91$ 4 and 5 $4 < x < 5$

$x = 4.1$ $(4.1)^3 + 2(4.1) = 77.121$

$x = 4.2$ $(4.2)^3 + 2(4.2) = 82.488$

$x = 4.3$ $(4.3)^3 + 2(4.3) = 88.107$

$x = 4.4$ $(4.4)^3 + 2(4.4) = 93.984$

$x = 4.5$ $(4.5)^3 + 2(4.5) = 100.125$

$x = 4.6$

$x = 4.7$

$x = 4.8$

$x = 4.9$

The solution is between 4.3 and 4.4

4.35 8.7

$x = 4.35$ $(4.35)^3 + 2(4.35) = 91.01$

The solution is 4.3

Examiner only

12. A triangular prism of length 2 metres is shown below.

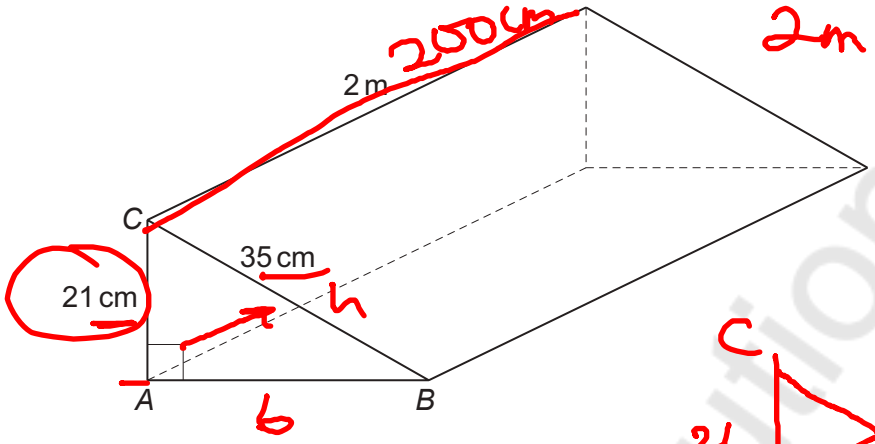


Diagram not drawn to scale

$AC = 21$ cm, $BC = 35$ cm and $B\hat{A}C = 90°$.

(a) Calculate the area of triangle ABC.
Give your answer in cm^2.
You must show all your working. [5]

Area of triangle = $\frac{1}{2} b \times 21$

Applying Pythagoras theorem [in a right angle Δ]

$35^2 = b^2 + 21^2$

$1225 = b^2 + 441$

$-441 \quad -441$

$784 = b^2$

$b = \sqrt{784} = 28$ cm

Area of triangle = $\frac{1}{2} \times 28 \times 21$

Area of triangle = $294 cm^2$

Examiner only

(b) Calculate the volume of the prism.
You must give the units of your answer. [3]

Volume of prism = Base Area × Height
= 294 × 200
= 58,800 cm³

Examiner only

13. Find the answer to the following number problem. [5]

'(the LCM of 12, 18 and 24) ÷ (the HCF of 36 and 54)'.

LCm of 12, 18, 24

2	12	18	24
2	6	9	12
2	3	9	6
3	3	9	3
3	1	3	1
	1	1	1

LCm = 2x2x2x3x3 = 72 *

Hef of 36 and 54

36 : 2x2x3x3

54 : 2x3x3x3

2	36
2	18
3	9
3	3
	1

2	54
3	27
3	9
3	3
	1

Hef = 2x3x3

Hef = 18

$\frac{LCm}{Hef} = \frac{72}{18} = 4$

Examiner only

14. *(a)* Rearrange the following formula to make x the subject.
Give your answer in its simplest form. [3]

$$2(x + y) = 7y - 3$$

$2(x+y) = 7y-3$

$2x + 2y = 7y - 3$

$-2y \quad -2y$

$2x = 5y - 3$

$x = \frac{5y-3}{2}$

(b) Write down the nth term of the following sequence. [2]

3, +3 6, +5 11, +7 18, +9 27, …

AP nth $u_n = a + (n-1)d$ ✓ * common difference

GP nth $u_n = ar^{n-1}$ * common ratio

3^{-2} 6^{-2} 11^{-2} 18^{-2} 27^{-2}

1 4 9 16 25

1^2 2^2 3^2 4^2 5^2

nth term $= n^2 + 2$

$1^2+2 = 3$

$2^2+2 = 6$

$3^2+2 = 11$

Examiner only

15. The diagram shows two right-angled triangles, joined together along a common side.

$S\hat{P}Q = 90°$, $S\hat{Q}R = 90°$, $S\hat{Q}P = 38°$, $PS = 8\,\text{cm}$ and $QR = 15\,\text{cm}$.

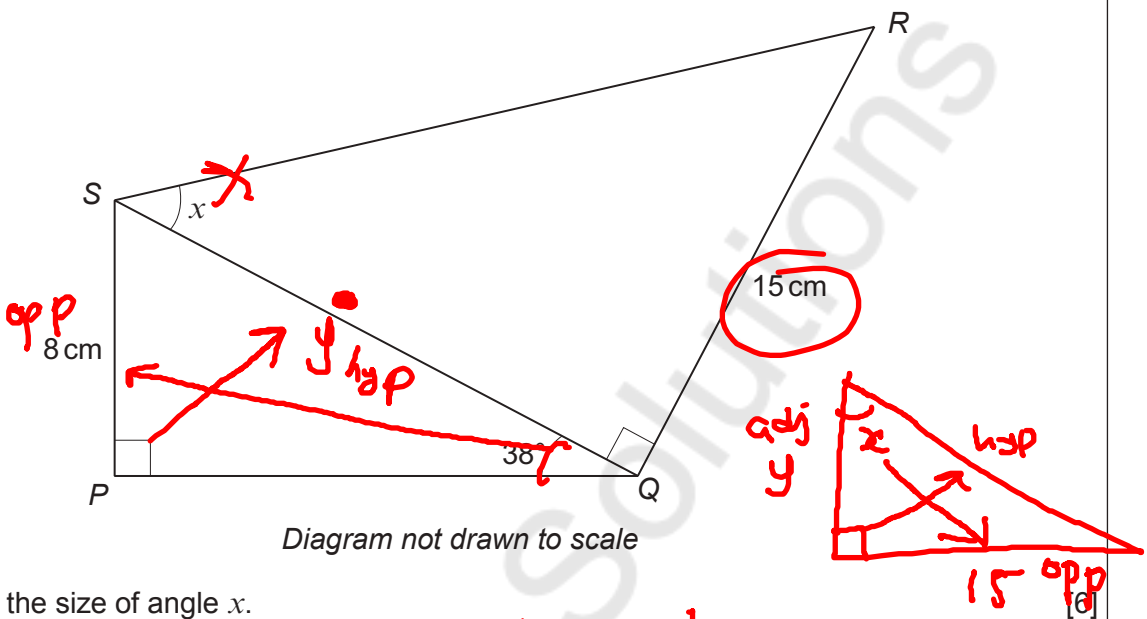


Diagram not drawn to scale

Calculate the size of angle x. [6]

Apply SOH CAH TOA

$\sin\theta = \frac{opp}{hyp}$

$\sin 38 = \frac{8}{y}$

$\sin 38 \times y = 8$

$y = \frac{8}{\sin 38}$

$y = \frac{8}{0.6157}$

$y = 12.99\,\text{cm}$

$\tan\theta = \frac{opp}{adj}$

$\tan x = \frac{15}{12.99}$

$\tan x = 1.1547$

$x = \tan^{-1}(1.1547)$

$x = 49.11°$

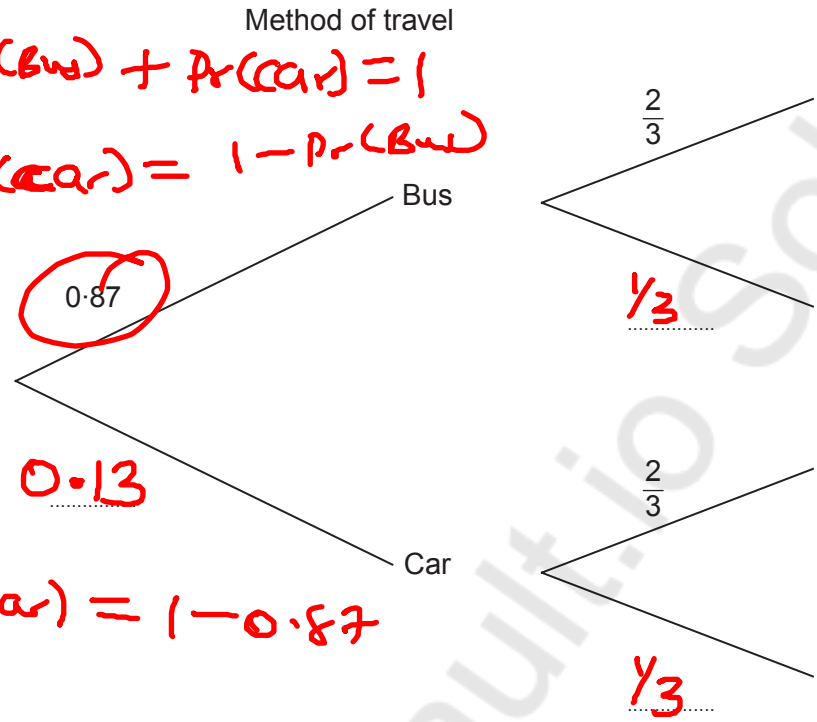
Examiner only

16. All the members of a farming club visited the Royal Welsh Agricultural Show.
They all travelled to the show either by bus or by car.
None of them visited the show on more than one day.
The decision to travel by car or by bus was independent of the day of the visit.

A member of the club was selected at random.
The probability that this member travelled by bus was 0·87.

The probability that this member visited the show on the first day was $\frac{2}{3}$.

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



(b) What is the probability that a member, chosen at random, was **not** one of those who travelled by bus on the first day of the show? [3]

END OF PAPER

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

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