Surname	Centre Number	Candidate Number
Other Names		0

GCSE

C300UB0-1

S19-C300UB0-1

MATHEMATICS – Component 2
Calculator-Allowed Mathematics
HIGHER TIER

THURSDAY, 6 JUNE 2019
– MORNING

2 hours 15 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.*(a)*	**5**	
2.*(b)*	**1**	
3.	**3**	
4.*(a)*	**3**	
4.*(b)*	**3**	
5.*(a)(b)(c)*	**8**	
5.*(d)(e)*	**5**	
6.	**5**	
7.	**9**	
8.	**5**	
9.	**8**	
10.	**5**	
11.	**5**	
12.	**6**	
13.	**2**	
14.	**4**	
15.*(a)*	**2**	
15.*(b)*	**3**	
16.	**11**	
17.	**7**	
18.	**7**	
19.	**6**	
20.	**3**	
Total	**120**	

C300UB01
01

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.

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 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.

You are reminded of the need for good English and orderly, clear presentation in your answers.

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:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

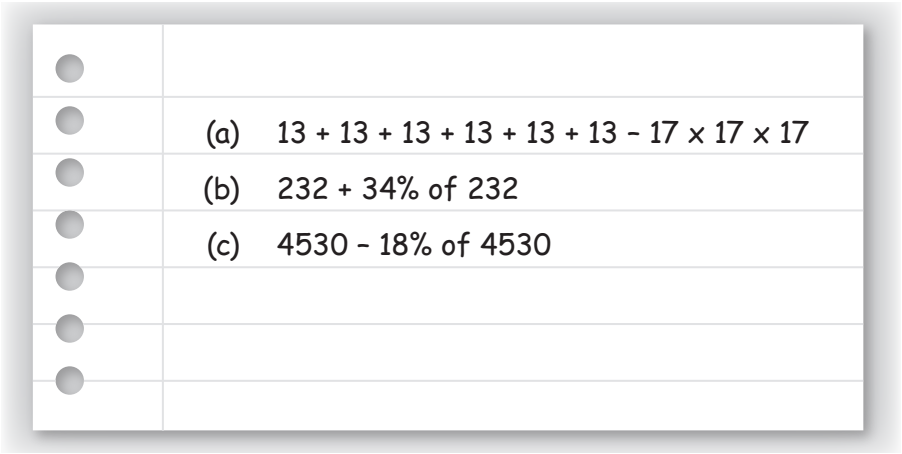
$$v^2 = u^2 + 2as$$

Examiner only

1. Harman has written some calculations he needs to work out for his homework.

Write down the calculation needed to work out each of the following using the fewest number of key presses. [4]

Give your answer to each question.



(a) .....

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Answer: .....

(b) .....

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Answer: .....

(c) .....

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Answer: .....

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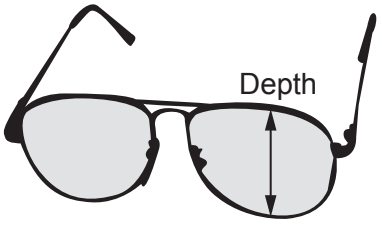
2. Marie works for an optician.
She records the depth of a lens in each of the 100 pairs of glasses on display.



Her results are summarised in the table.

Depth of lens, x mm, to the nearest mm	Number of pairs of glasses
$10 \leqslant x < 20$	5
$20 \leqslant x < 30$	20
$30 \leqslant x < 40$	23
$40 \leqslant x < 50$	52

(a) (i) Calculate an estimate for the mean depth of a lens. [4]

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(ii) In which group does the median lie? [1]

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Examiner only

(b) In the display of 100 pairs of glasses at *Davy's Opticians*, the mean depth of a lens is exactly the same as Marie's opticians.

Marie says,

"Considering only the mean depth of a lens, our display is **certain** to be very similar to the display in *Davy's Opticians*."

Explain why Marie is incorrect. [1]

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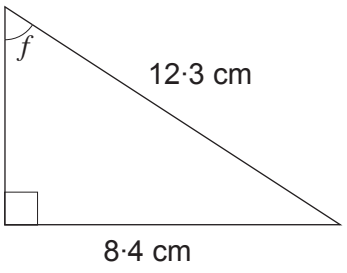

Diagram not drawn to scale

Calculate the size of angle f. [3]

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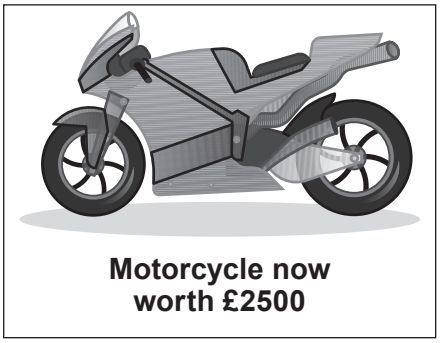
4. *(a)* This motorcycle depreciates by 16% per annum.



Motorcycle now worth £2500

After how many whole years will this motorcycle be worth less than £1000?
You must show all your working. [3]

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Motorcycle will be worth less than £1000 after ..... whole years.

(b) Rachela takes out a loan for £500 from an online loan company.
The interest rate is 325% per annum.

Rachela is thinking she would pay off the loan and interest in full after 3 years.
A friend correctly says,

"That is a very high rate of interest. You will owe over £30000."

Calculate the total amount Rachela would have to pay back after 3 years. [3]

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Examiner only

5. *(a)* Expand and simplify $(x + 6y)(3x + 5y)$. [3]

(b) Factorise $x^2 - 13x + 36$. [2]

(c) Solve $w^2 + 7w - 18 = 0$. [3]

(d) Factorise $y^2 - 121$. [1]

(e) You are given that:

- $y = x^2 + bx + c$
- $y = 16$ when $x = 0$
- $y = 0$ when $x = -2$

Find the values of b and c. [4]

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6. A car travels at an average speed of 45 mph for 40 minutes.
The next part of the car's journey takes 25 minutes at an average speed of 60 mph.

Show that the average speed of the entire journey is just over 50 mph. [5]

Examiner only

7. *(a)* The volume of a sphere with a radius of 2·7 cm is equal to the volume of a cuboid. The base of the cuboid has an area of 14·2 cm^2.

Calculate the height of the cuboid. [4]

(b) A piece of paper is in the shape of a circle. The circumference of the circle is 86 cm.

The paper is cut into 2 semi-circles.
Calculate the **perimeter** of one of the semi-circles.

Give your answer correct to the nearest $\frac{1}{10}$ cm. [5]

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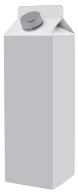

8. 7 cartons of apple juice and 2 cartons of grapefruit juice cost £6.15 altogether.
5 cartons of apple juice and 8 cartons of grapefruit juice cost £9.19 altogether.

Use an algebraic method to calculate the **total** cost of 2 cartons of apple juice and 5 cartons of grapefruit juice.

[5]

Total cost of 2 cartons of apple juice and 5 cartons of grapefruit juice is £ .....

Examiner only

9. In scientific reports, temperatures are often given using more than one temperature scale.

Celsius, Fahrenheit and kelvin are all measured on linear scales.

Use the information given below to complete the tables.

(a)

Degrees Celsius	Degrees Fahrenheit
30	.....
40	104
50	122
60	.....

[1]

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(b)

Kelvin	Degrees Celsius
0	.....
100	.....
200	.....
300	26·85
400	126·85

[2]

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(c)

Kelvin	Degrees Celsius	Degrees Fahrenheit
320	.....	.....

[5]

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Examiner only

10. You are given that y is inversely proportional to x, and that $y = 124{\cdot}5$ when $x = 18$.

(a) Find a formula for y in terms of x. [3]

(b) Use the formula you found in *(a)* to complete the following table. [2]

x	$\frac{1}{2}$	18	
y		124·5	90

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11. You are given the following:

1 kg ≈ 2·2 pounds 1 pound = 16 ounces

In Keto's restaurant, steak is on the menu.

How much would it cost to order an 8-ounce steak in Keto's restaurant?
You must show all your working. [5]

Examiner only

12. Ben draws an irregular pentagon.
The interior angles of the pentagon he has drawn are all less than 180°.

Ben attempts to express the interior angles of his pentagon using algebra.
His expressions are

$$x°, \quad (x + 40)°, \quad (2x - 30)°, \quad 3(x - 40)° \quad \text{and} \quad 3x°.$$

Show that Ben is incorrect. [6]

Ben is incorrect because .....

13. Find the nth term of the following sequence. [2]

–7, –4, 1, 8, 17, ...

Examiner only

14. The graph below shows the water level in a container from 13:00 to 14:00.

(a) Calculate the rate of the increase in the depth of water in the container. Give your answer in cm/min. [2]

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Rate of increase ..... cm/min

(b) (i) If the depth of water in the container continues to rise at the same rate, what would be the height of the water in the container at 15:20? [1]

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(ii) Why may it not be sensible to state the height of the water in the container at 17:00? [1]

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Examiner only

15. *(a)* The density of glass in a bottle is 2·4 g/cm^3.
The volume of glass used to make the bottle is 13·4 cm^3.

Calculate the mass of the glass bottle.
Give your answer in grams. [2]

Mass ..... g

(b) A force of 135 N is applied to an area of 3600 cm^2.

Calculate the pressure.
Give your answer in N/m^2. [3]

Pressure ..... N/m^2

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16. The diagram below shows a plan view of a stage, *ABCD*.
ABC is a sector of a circle, with centre *C*.

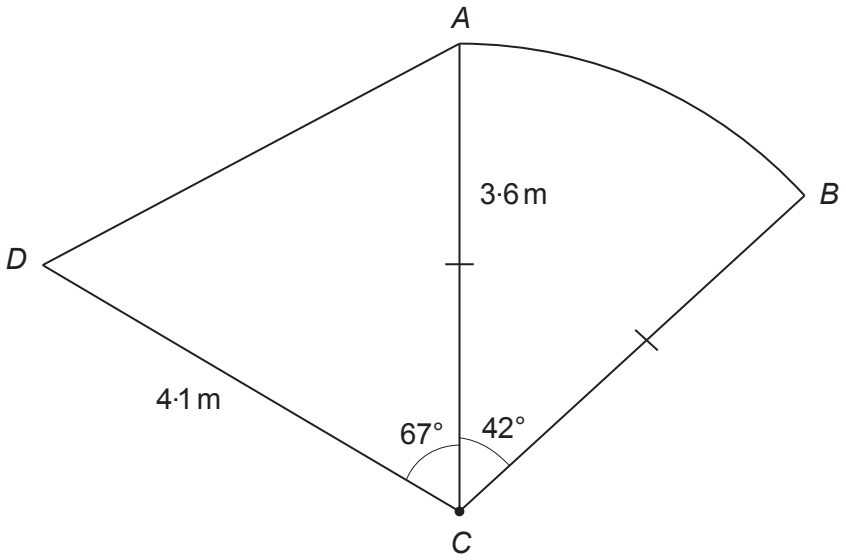

Diagram not drawn to scale

(a) The band *Fredalive* need a stage area of at least 11·5 m^2 to set up equipment and perform.

Is this stage suitable for *Fredalive* to set up equipment and perform?
You must show all your working. [5]

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Conclusion
The stage is suitable:

Yes ☐ No ☐

Examiner only

(b) *Fredalive* want to place a banner around the perimeter of the stage.

Will a banner of length 14 m fit around this stage without leaving a gap?
You must show all your working. [6]

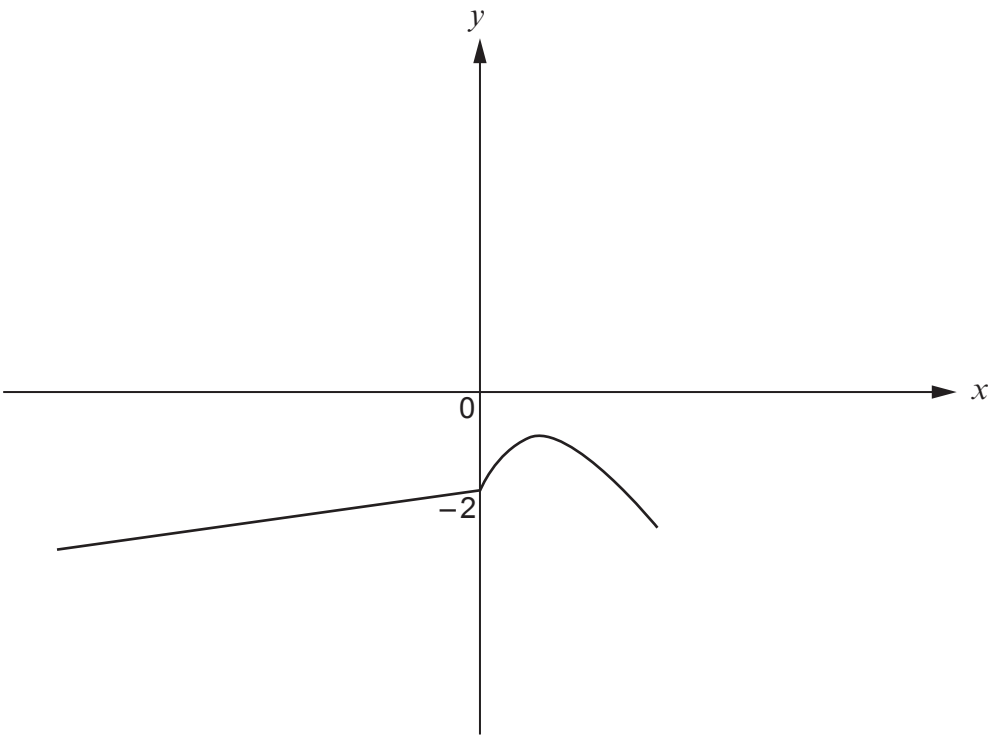
Conclusion
The banner will fit without leaving a gap:

Yes ☐ No ☐

Examiner only

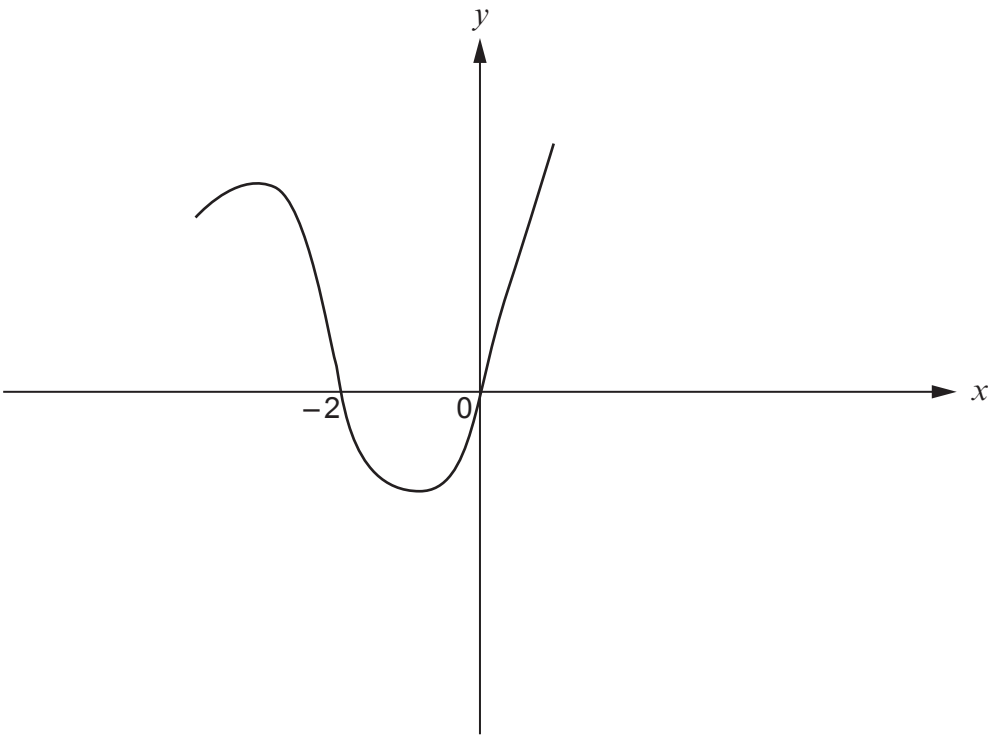
17. *(a)* The diagram shows a sketch of $y = f(x)$.

On the same diagram, sketch the curve $y = -f(x)$.
Mark clearly the coordinates of any point where this curve crosses an axis. [2]



(b) The diagram shows a sketch of $y = g(x + 2)$.

On the same diagram, sketch the curve $y = g(x - 1)$.
Mark clearly the coordinates of the points where this curve crosses the x-axis. [3]



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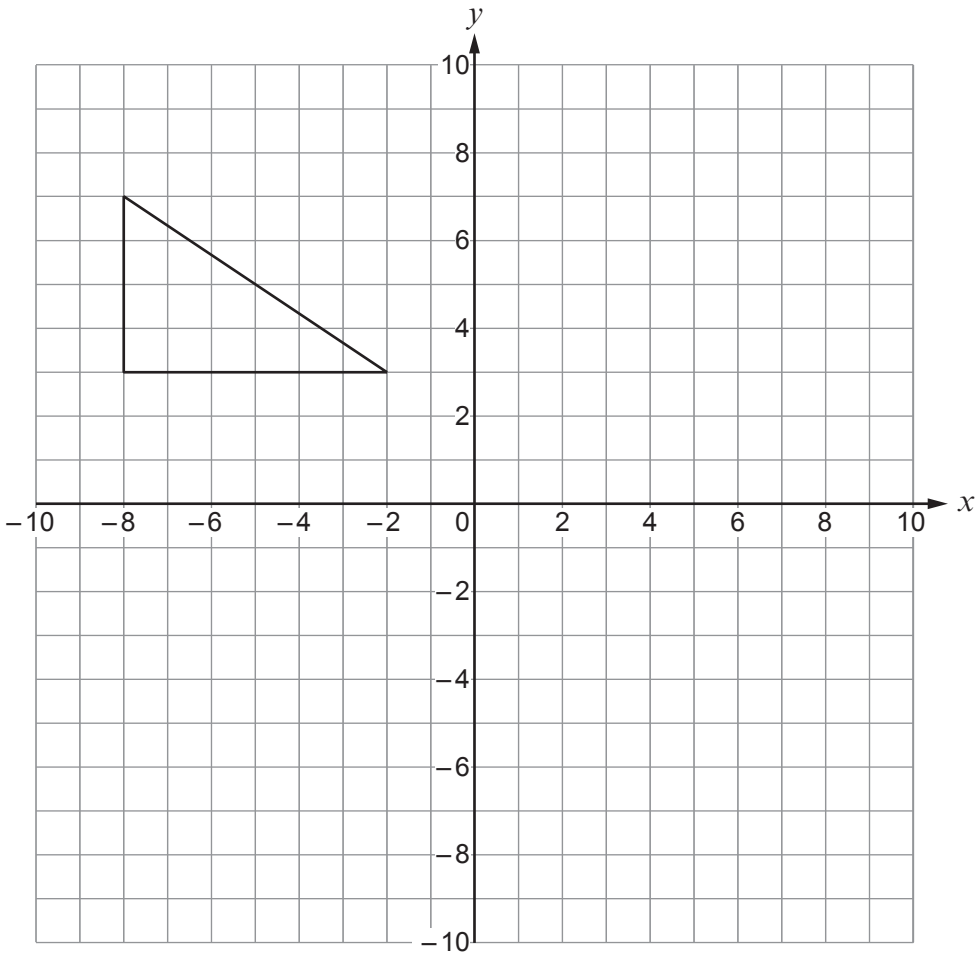
(c) Enlarge the triangle, shown on the grid below, by a scale factor of $-\frac{1}{2}$ with (2, 1) as the centre of the enlargement. [2]



Examiner only

18. A cone has a radius x cm, a perpendicular height $(x + 2)$ cm and a slant height 16·4 cm.

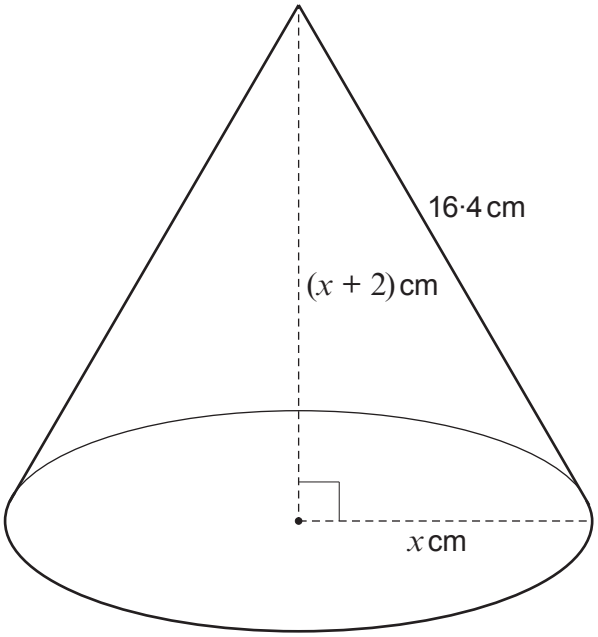


Diagram not drawn to scale

Show that x satisfies the equation $x^2 + 2x - 132{\cdot}48 = 0$ and calculate the volume of the cone. You must show all your working. [7]

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19. The driving theory test consists of 50 questions.
At least 43 of these questions must be answered correctly to pass the test.
For each question in the test, four possible answers are given. Only one of these answers is correct.

Waldo takes the test.
Waldo knows 78% of the facts assessed in the test.
For each question based on these facts he selects the correct answer.

On all other questions he randomly selects one of the four possible answers.

(a) A question is selected at random from the paper.
Calculate the probability that Waldo correctly answers the question. [4]

(b) Is Waldo likely to pass his driving theory test?

Yes ☐ No ☐

You must show all your working to support your answer. [2]

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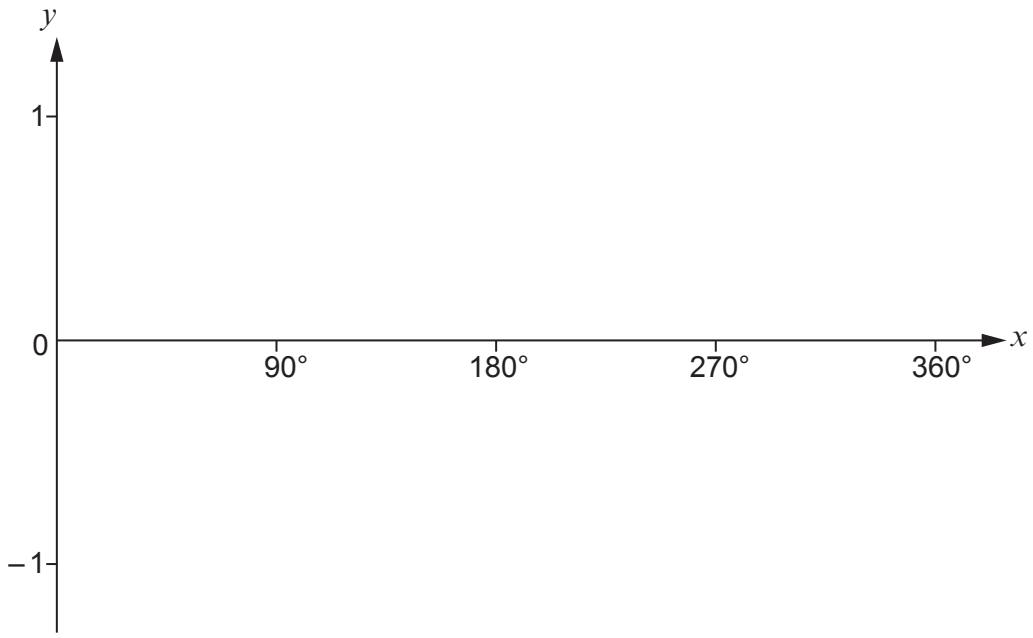
20. *(a)* Using the axes below, sketch a graph of $y = \sin x$ for values of x from 0° to 360°. [1]



(b) Find all the solutions of the following equation in the range 0° to 360°. [2]

$$5\sin x = 2$$

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END OF PAPER

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