

Surname	Centre Number	Candidate Number
Other Names		0



## GCSE

3300U60-1



## MATHEMATICS UNIT 2: CALCULATOR-ALLOWED HIGHER TIER

WEDNESDAY, 14 NOVEMBER 2018 – MORNING

1 hour 45 minutes

### ADDITIONAL MATERIALS

A calculator will be required for 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 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  $\pi$  as 3.14 or use the  $\pi$  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 7, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

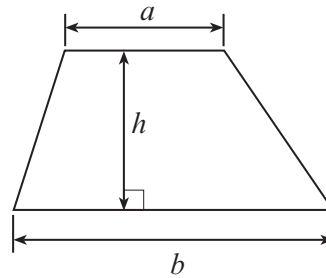
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	3	
3.	6	
4.	3	
5.	4	
6.	3	
7.	6	
8.	6	
9.	7	
10.	1	
11.	2	
12.	4	
13.	5	
14.	4	
15.	6	
16.	3	
17.	7	
18.	6	
<b>Total</b>	<b>80</b>	



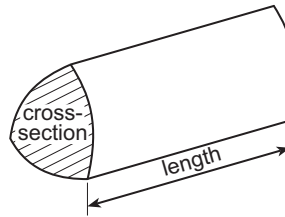
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### Formula List - Higher Tier

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

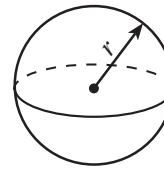


**Volume of prism** = area of cross-section  $\times$  length



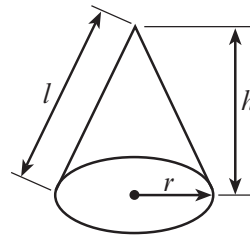
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**Surface area of sphere** =  $4\pi r^2$



**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** =  $\pi r l$

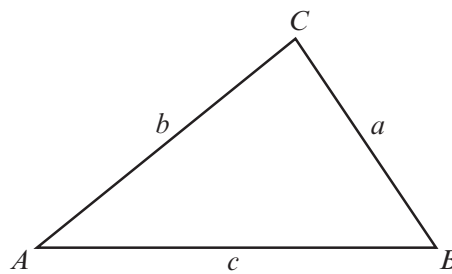


**In any triangle ABC**

**Sine rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$



### The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$  where  $a \neq 0$  are given by  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

### Annual Equivalent Rate (AER)

AER, as a decimal, is calculated using the formula  $\left(1 + \frac{i}{n}\right)^n - 1$ , where  $i$  is the nominal interest rate per annum as a decimal and  $n$  is the number of compounding periods per annum.



1. (a) A number is decreased by 12% of its value.  
This is done 3 times, each time decreasing the previous value by 12%.  
Circle the multiplier that you would use to find the value after the 3 decreases. [1]

$\times 0.36$

$\times 0.88^3$

$\times 0.12^3$

$\times 0.3^{12}$

$\times 0.3^{88}$

- (b) Calculate the percentage change when 42.5 is increased to 45.9. [3]

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2. Display the following information in a Venn diagram. [3]

- Universal Set ( $\epsilon$ ): Integers between 74 and 80 inclusive.
- Set A: Even numbers.
- Set B: Multiples of 3.



3. The table below shows some of the values of  $y = x^2 + 4x - 1$  for values of  $x$  from  $-5$  to  $2$ .

$x$	$-5$	$-4$	$-3$	$-2$	$-1$	$0$	$1$	$2$
$y = x^2 + 4x - 1$	$4$	$-1$	$-4$		$-4$	$-1$	$4$	

(a) Complete the table by finding the value of  $y$  for  $x = -2$  and for  $x = 2$ . [2]

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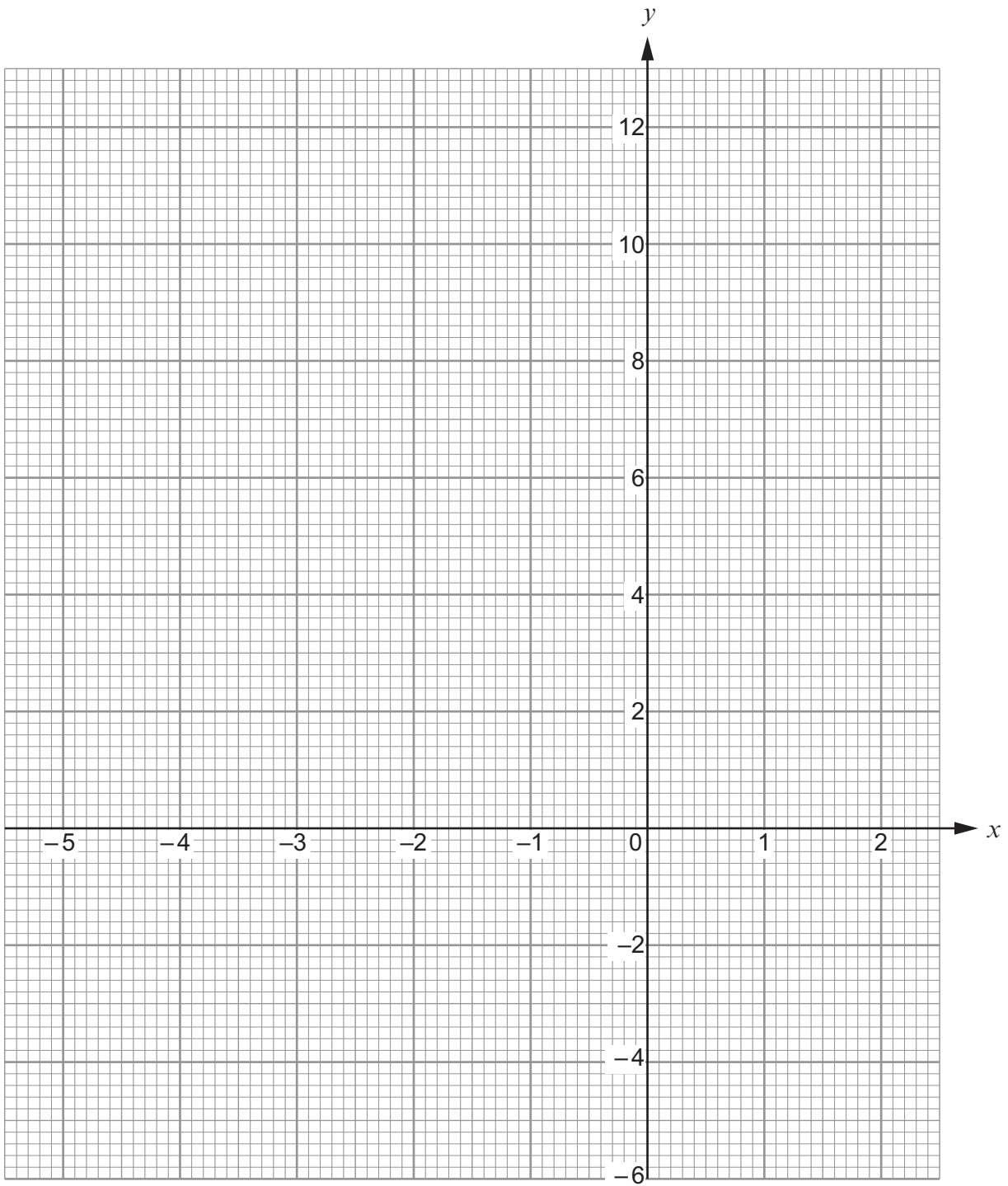
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(b) On the graph paper opposite, draw the graph of  $y = x^2 + 4x - 1$  for values of  $x$  from  $-5$  to  $2$ . [2]

(c) Draw the line  $y = 2$  on the graph paper.  
Write down the values of  $x$  where the line  $y = 2$  cuts the curve  $y = x^2 + 4x - 1$ . [2]

Values of  $x$  are ..... and .....









6. (a) What is the gradient of the straight line with equation  $6y = 3x + 7$ ?  
Circle the correct answer. [1]

$\frac{1}{2}$

6

2

3

$\frac{7}{6}$

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- (b) What is the value of  $y$  at the point where the line  $5x + y + 3 = 0$  crosses the  $y$ -axis?  
Circle the correct answer. [1]

0

-5

3

-3

$\frac{5}{3}$

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- (c) What are the coordinates of the point where the lines with equations  $x + y = 7$  and  $x - y = 3$  intersect?  
Circle the correct answer. [1]

(4, 3)

(7, 4)

(5, 2)

(3, 7)

(-5, 2)

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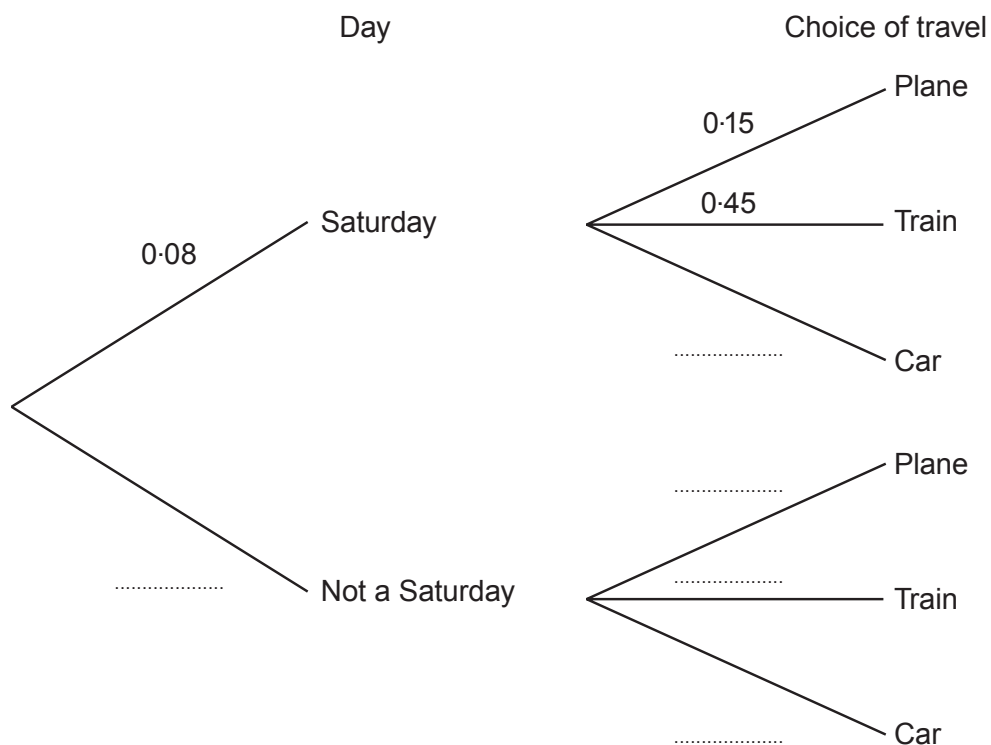




8. Alwena regularly travels from Anglesey to Cardiff to attend meetings. For each meeting, she chooses one of three ways to travel: by plane, train or car. The probability of a meeting being held on a Saturday is 0.08. The probability that Alwena travels by plane to a meeting is 0.15. The probability that she travels by train is 0.45. Her decision on how to travel is independent of the day on which the meeting is held.

(a) Complete the following tree diagram.

[3]



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(b) A meeting is chosen at random. Calculate the probability that the meeting is held on a Saturday and that Alwena travels by plane or by car. [3]

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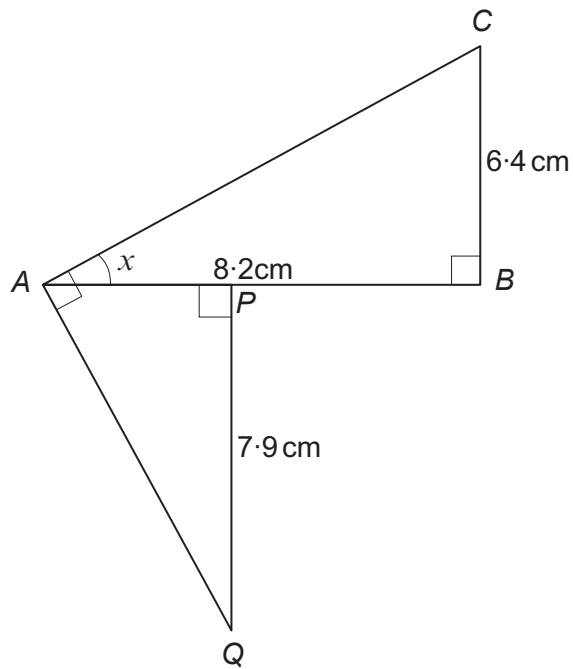
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9. The diagram below shows two right-angled triangles  $ABC$  and  $APQ$ .  
 $AB = 8.2$  cm,  $BC = 6.4$  cm and  $PQ = 7.9$  cm.

$$\widehat{CAQ} = 90^\circ.$$



*Diagram not drawn to scale*

- (a) Calculate the size of angle  $x$ .

[3]

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- (b) Calculate the length  $AQ$ .

[4]

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10. A googol is the number  $1 \times 10^{100}$ .  
Circle the value that is 90% of a googol.

[1]

$1 \times 9^{100}$

$1 \times 10^{90}$

$1 \times 9^{90}$

$9 \times 10^{90}$

$9 \times 10^{99}$

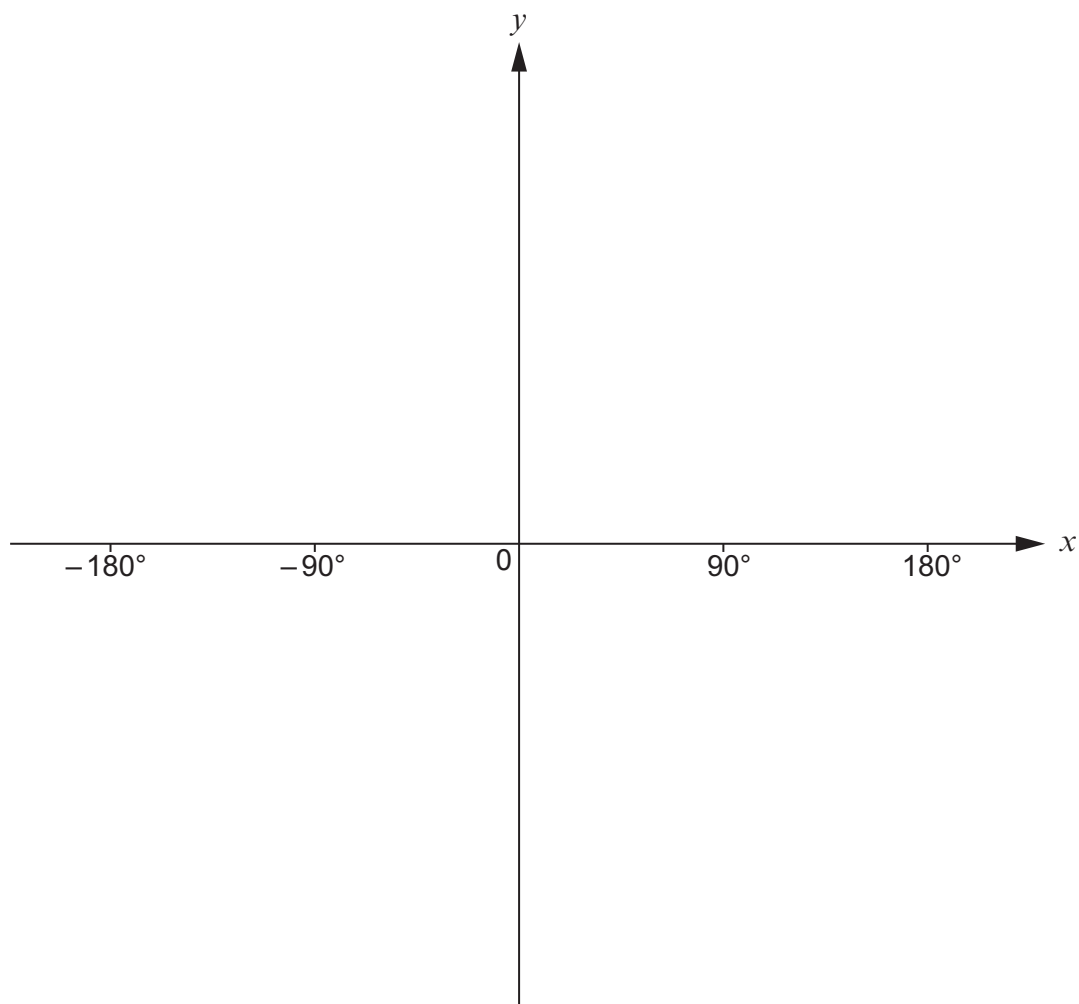
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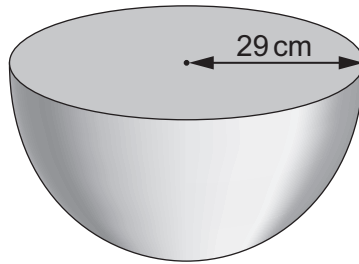
11. Sketch the curve  $y = \tan x$ , for values of  $x$  in the range  $x = -180^\circ$  to  $x = 180^\circ$ .

[2]



12. Calculate the **total** surface area of a solid hemisphere with a base radius of 29 cm.

[4]



*Diagram not drawn to scale*

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Total surface area = ..... cm<sup>2</sup>



13. (a) Fully factorise the expression  $c^3 - cd^2$ . [3]

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(b) Factorise and simplify  $5(e - 1)^2 + 3(e - 1)$ . [2]

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15. (a) Three unbiased 6-sided dice are rolled at the same time.  
Calculate the probability they will all land on a 5.

[2]

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(b) Four unbiased 6-sided dice are now rolled.  
Calculate the probability that at least three of the dice will land on a 5.

[4]

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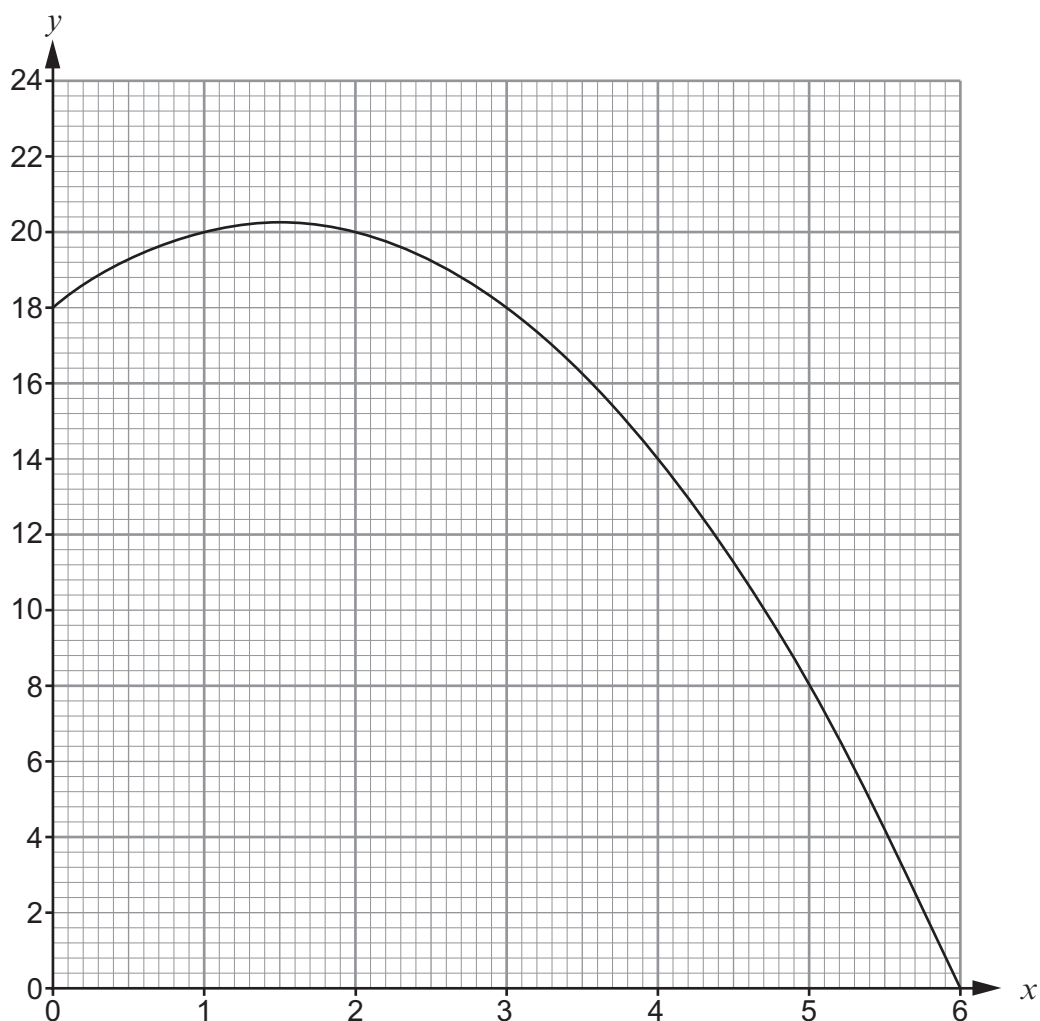
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16. The graph of  $y = 18 + 3x - x^2$ , for values of  $x$  from  $x = 0$  to  $x = 6$ , is drawn below.



Use the trapezium rule, with the ordinates  $x = 0$ ,  $x = 1$ ,  $x = 2$ ,  $x = 3$ ,  $x = 4$ ,  $x = 5$  and  $x = 6$ , to estimate the area of the region bounded by the curve, the positive  $x$ -axis and the positive  $y$ -axis. [3]

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