OCR
Oxford Cambridge and RSA

Higher Check In - 7.01 Graphs of equations and functions

1. Sketch $xy = 1$.

2. Complete a table of values for the equation $y = x^3 - 3x^2$ with x from -1 to 4. Plot the graph on suitable axes. Use your graph to find the solution to $x^3 - 3x^2 = 2$.

3. Using your calculator, complete the table of values for $y = 2 \times 1.9^x$, giving your values to 2 decimal places.

x	-3	-2.5	-2	-1.5	-1	-0.5	0	0.5	1
y			0.55		1.05			2.76	

   Plot the graph on suitable axes.

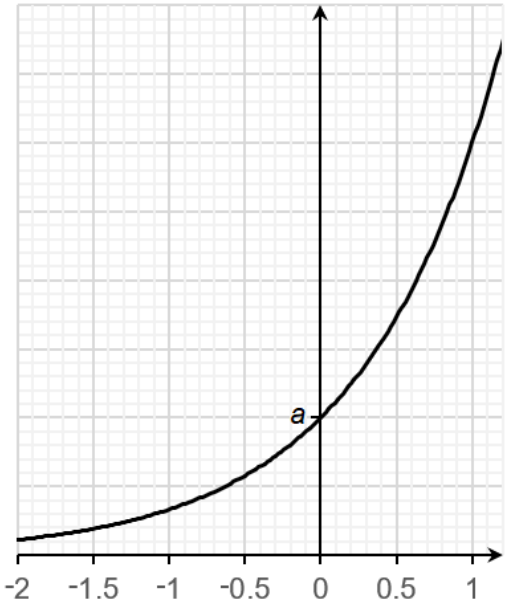
4. Which of the following are two x-intercepts of $y = \cos x$?

   A $x = 90°$ and $x = 180°$ **B** $x = 0°$ and $x = -180°$ **C** $x = -90°$ and $x = 270°$ **D** $x = 0°$ and $x = 360°$

5. The graph of $y = x^2 - 6x + 11$ has a turning point at (a, b). Find the value of a and b.

6. Clara says that the circle with equation $x^2 + y^2 = 2$ has a radius of 4. Explain why she is incorrect.

7. Here is the graph of $y = 3^x$.



   Mia says $a = 3$. Explain if they are right, showing your working clearly.

8. Pete needs to sketch the quadratic $y = x^2 - 4x - 5$. His working is below.

x-intercepts	*y*-intercept	turning point
$x^2 - 4x - 5 = 0$ $(x - 1)(x + 5) = 0$ $x = 1$ or $x = -5$ *x*-intercepts → (1, 0) and (-5, 0)	when $x = 0$ $y = 0^2 - 4 \times 0 - 5$ $y = -5$ *y*-intercept → (0, -5)	$y = (x - 2)^2 - 9$ turning point → (2, 9)

Check his working, correct any mistakes and then sketch the graph.

9. The line $y = 2.4x$ intersects a circle with centre (0, 0) at two points, where $x = 5$ and $x = -5$. Find the radius of the circle.

10. The turning point of the graph $y = x^2 + ax + b$ is (-2, 8). Find *a* and *b*.

Extension

Complete the table of values for both $y = 2^x$ and $y = 2^{2x}$. Plot both curves on the graph paper accurately.

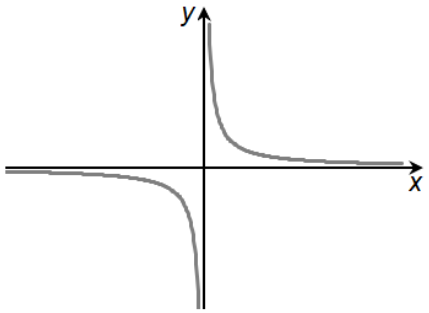
x	-3	-2	-1	0	1	2
$y = 2^x$		$2^{-2} = 0.25$				
$y = 2^{2x}$						$2^{2 \times 2} = 16$

Comment on the similarities and differences.

What would you expect $y = 2^{3x}$ to look like?

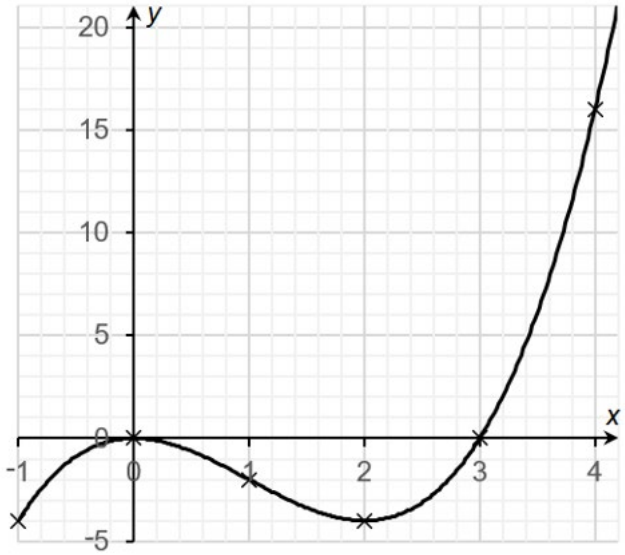
Answers

1.



2.

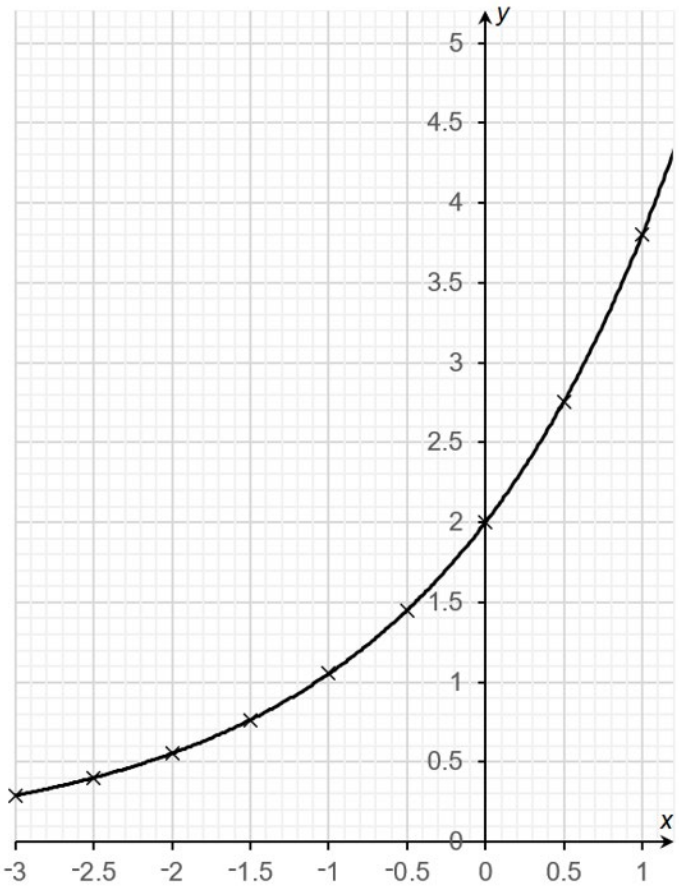
x	-1	0	1	2	3	4
y	-4	0	-2	-4	0	16



(3.2, 2) or when $y = 2$, $x = 3.2$

3.

x	-3	-2.5	-2	-1.5	-1	-0.5	0	0.5	1
y	0.29	0.40	0.55	0.76	1.05	1.45	2.00	2.76	3.80



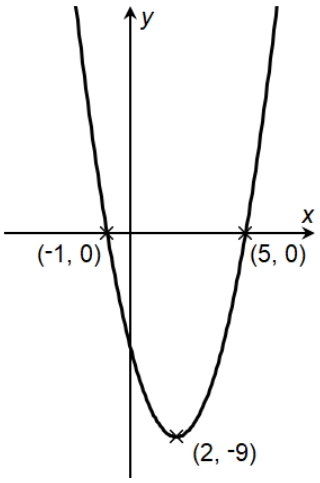
4. **C** $x = -90°$ and $270°$

5. $y = (x-3)^2 + 2$ so the turning point is (3, 2).

6. The general equation of a circle is $x^2 + y^2 = r^2$, so $r^2 = 2$ and $r = \sqrt{2}$.

7. At *a*, $x = 0$ so $y = 3^0 = 1$. Mia is wrong as $a = 1$.

8. The factorisation is incorrect, the correct *x*-intercepts should be (-1, 0) and (5, 0).
The turning point has been determined incorrectly and should be (2, -9).

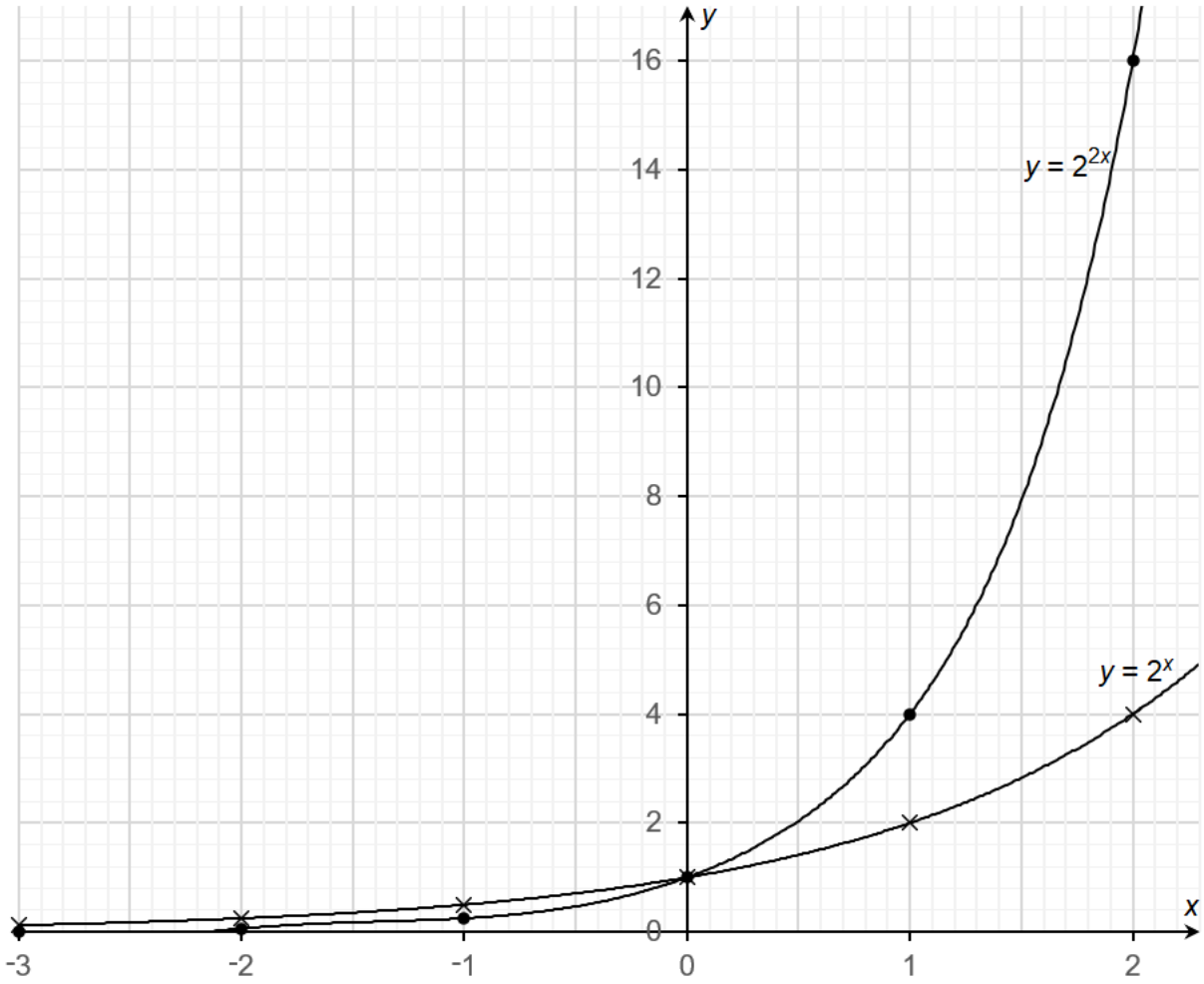


9. Radius = 13

10. $a = 4$ and $b = 12$

Extension

x	-3	-2	-1	0	1	2
$y = 2^x$	0.125	0.25	0.5	1	2	4
$y = 2^{2x}$	0.015625	0.0625	0.25	1	4	16



Both graphs pass through (0, 1).
Both graphs lie above the x-axis in the first and fourth quadrants.
$y = 2^{2x}$ increases/decreases more steeply than $y = 2^x$ because the power is twice as large.

$y = 2^{3x}$ will be a similar curve also passing through (0, 1) but it will be steeper than $y = 2^{2x}$.

GCSE (9–1)

MATHEMATICS

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GCSE (9–1)

MATHEMATICS

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Recognise and sketch $y = \frac{1}{x}$			
AO1	2	Use a table of values to plot a cubic graph			
AO1	3	Use a table of values to plot an exponential graph			
AO1	4	Recognise graphs of trigonometric functions			
AO1	5	Find the turning point of a quadratic graph algebraically			
AO2	6	Recognise and use the equation of a circle, centre (0, 0)			
AO2	7	Work with the graphs of exponential functions			
AO2	8	Sketch graphs of quadratic functions			
AO3	9	Solve problems involving the equation of a circle with centre (0, 0)			
AO3	10	Solve problems involving turning points of quadratic functions			

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