Foundation tier unit 16a check in test

Non-calculator

Q1. Which of these expressions is **not** a quadratic function?

$x^2 - 9$ $3(2x + 5)$ $4x(3x - 1)$ $(x + 5)(x - 2)$

Q2. Expand and simplify $(x + 3)(x + 5)$

Q3. Expand and simplify $(x + 3)(x - 1)$

Q4. Expand and simplify $(x - 5)^2$

Q4. Factorise $x^2 + 3x - 4$

Q6. Factorise $x^2 - 2x - 15$

Q7. Factorise $x^2 - 16$

Q8. Solve the equation $x^2 - 12x + 27 = 0$

Q9. Solve the equation $x^2 - x - 20$

Q10. Find the roots of the function $f(x) = x^2 + 11x + 24$

Topics listed in objectives

- Define a ‘quadratic’ expression;
- Multiply together two algebraic expressions with brackets;
- Square a linear expression, e.g. $(x + 1)^2$;
- Factorise quadratic expressions of the form $x^2 + bx + c$;
- Factorise a quadratic expression $x^2 – a^2$ using the difference of two squares;
- Solve quadratic equations by factorising;
- Find the roots of a quadratic function algebraically.

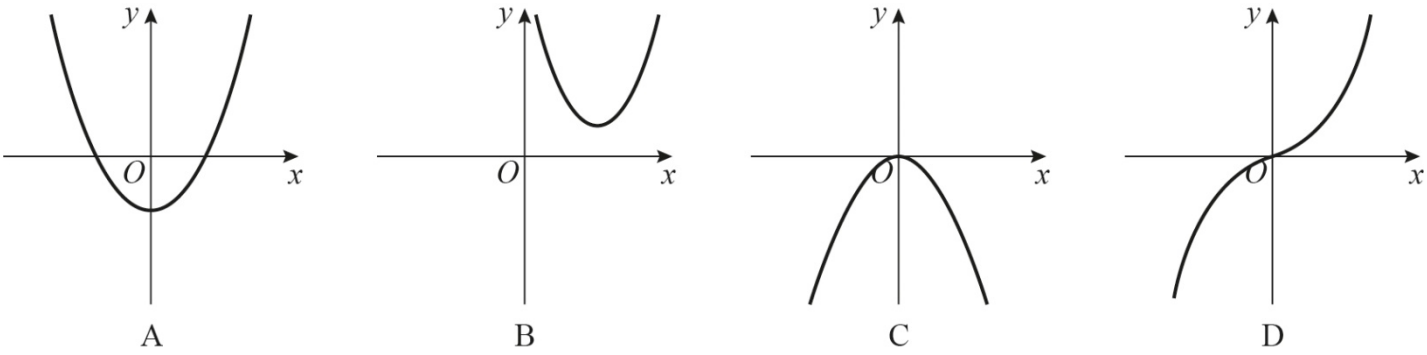
Answers

Q1. $3(2x + 5)$
Q2. $x^2 + 8x + 15$
Q3. $x^2 + 2x – 3$
Q4. $x^2 – 10x + 25$
Q5. $(x – 1)(x + 4)$
Q6. $(x – 5)(x + 3)$
Q7. $(x + 4)(x – 4)$
Q8. $x = 9$, $x = 3$
Q9. $x = –4$, $x = 5$
Q10. $x = –3$ and $x = –8$

Foundation tier unit 16b check in test

Non-calculator

Q1. Which of these graphs does **not** show a quadratic function?



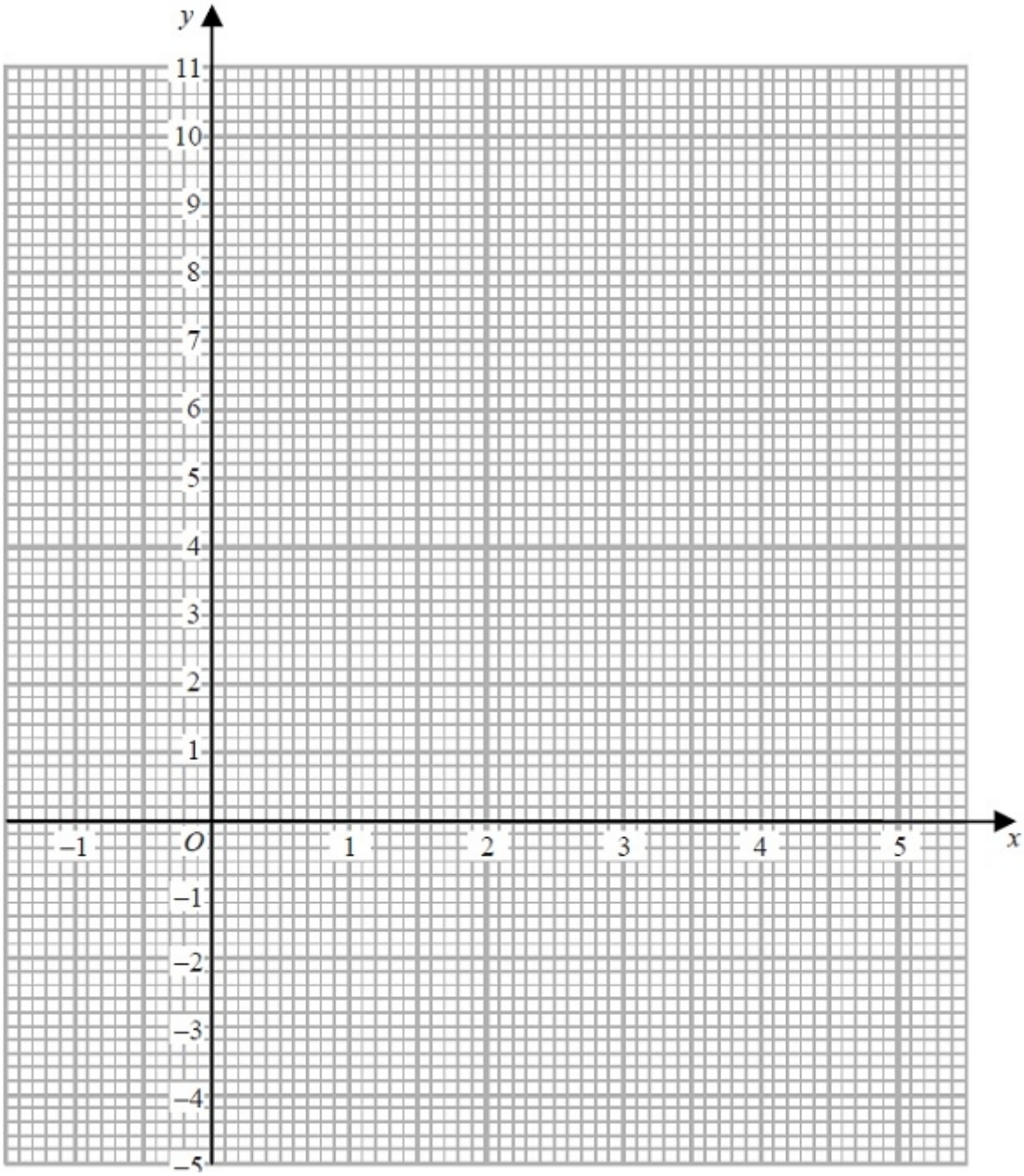
[Q2–4 linked]

Q2. Here is a table of values for $y = x^2 - 5x + 3$

Find the two missing values.

x	–1	0	1	2	3	4	5
y		3	–1		–3	–1	3

Q3. Using the table of values in question 2, on the grid below, draw the graph of $y = x^2 - 5x + 3$ for values of x from $x = -1$ to $x = 5$.



Give the equation of the line of symmetry of the graph.

Q4. Use the graph in question 3 to find estimates of the solutions of the equation $x^2 - 5x + 3 = 0$

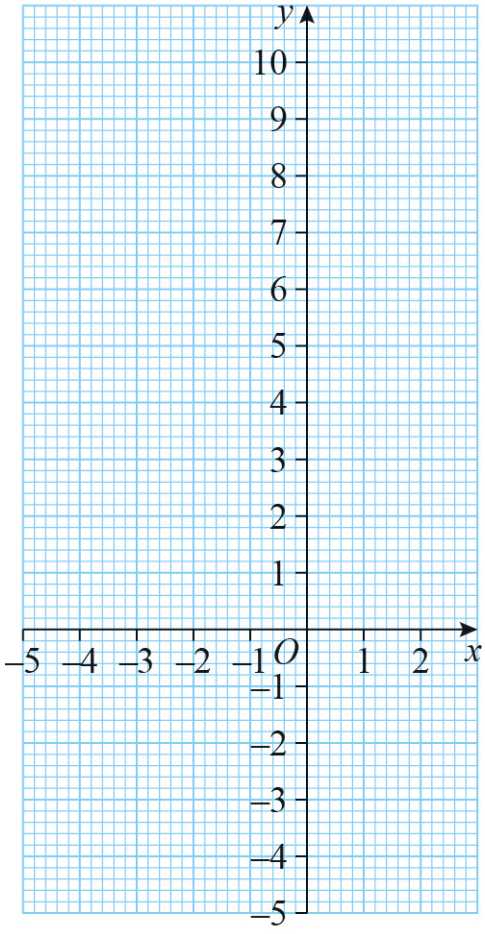
[Q5–6 linked]

Q5. Here is a table of values for $y = x^2 + 3x - 1$

Find the two missing values.

x	–5	–4	–3	–2	–1	0	1	2
y	9		–1	–3	–3		3	9

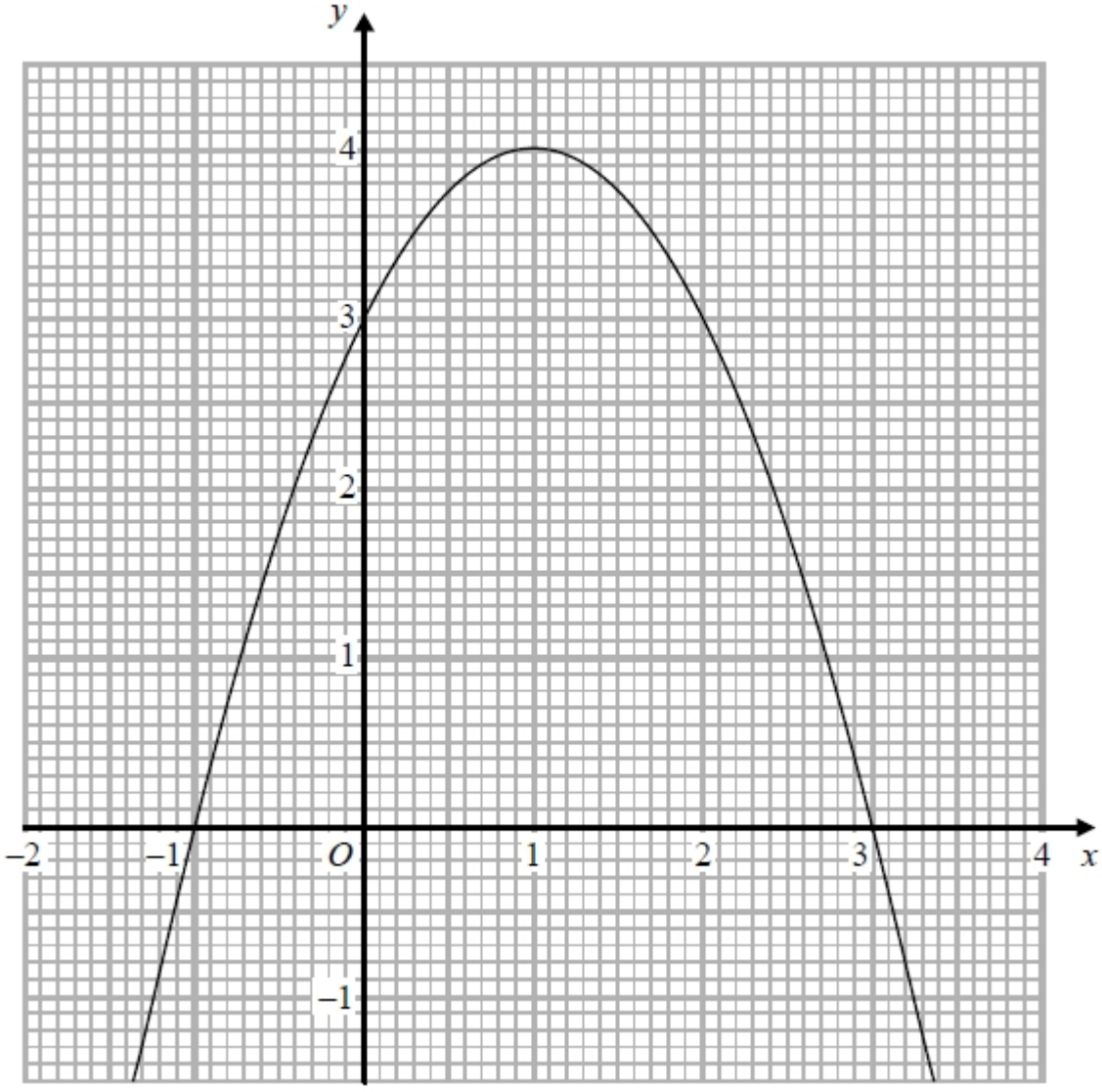
Q6. Using the table of values in question 5, on the grid below, draw the graph of $y = x^2 + 3x - 1$ for values of x from $x = -5$ to $x = 2$.



Use the graph to estimate the solution to $x^2 + 3x - 1 = 2$

[Q7–9 linked]

Q7. The graph of $y = -x^2 + 2x + 3$ is drawn on the grid.

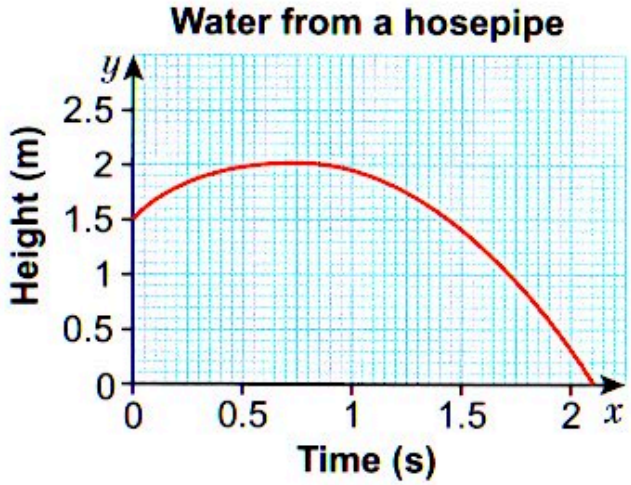


Write down the coordinates of the turning point of the graph.

Q8. Write down the coordinates of point at which the graph intercepts the y-axis.

Q9. Write down the roots of the equation $-x^2 + 2x + 3 = 0.5$.

Q10. Hannah is watering her garden.
The water coming out of the hosepipe forms a smooth curve.
This graph models the curve.



How long did the water take to hit the ground after leaving the hosepipe?

Topics listed in objectives

- Generate points and plot graphs of simple quadratic functions, then more general quadratic functions;
- Identify the line of symmetry of a quadratic graph;
- Find approximate solutions to quadratic equations using a graph;
- Interpret graphs of quadratic functions from real-life problems;
- Identify and interpret roots, intercepts and turning points of quadratic graphs.

Answers

Q1. D
Q2. when $x = -1$, $y = 9$; when $x = 2$, $y = -3$
Q3. $x = 2.5$
Q4. $x = 0.7$, $x = 4.3$
Q5. when $x = -4$, $y = 3$; when $x = 0$, $y = -1$
Q6. $x = -3.8$ and $x = 0.8$
Q7. (1, 4)
Q8. (0, 3)
Q9. $x = -0.9$, $x = 2.9$
Q10. 2.1 seconds