# OCR 07 Graphs of Equations and Functions (Higher)

1. A graph has the equation .

Find the coordinates of the points where the line intercepts the *x*-axis.

1. Find the equation of a line perpendicular to the line .
2. The graph of  is translated 3 units up.

What is the equation of the transformed graph?

1. Which of the following lines are parallel to each other?

A: 

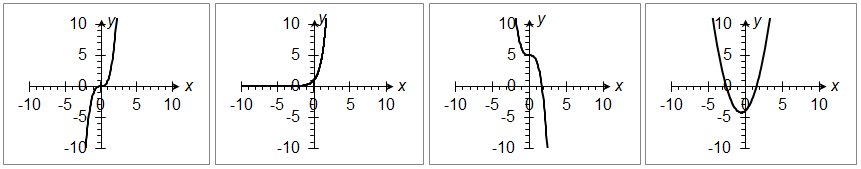
B: 

C: 

D: 

E: 

1. Which graph below shows the equation ?



Graph 4

Graph 3

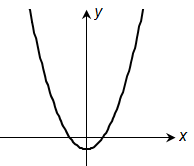
Graph 2

Graph 1

1. Find the equation of the line that is perpendicular to  and that intersects it at the point where .
2. Find the turning point of the graph  by completing the square.
3. Use the velocity-time graph below to calculate the distance travelled during the 8 seconds.
4. Complete the table below of values for  and use this table to plot the graph.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| *y* |  | 2.5 |  | 10 |  | 40 |  |

1. Use the graph below to calculate the acceleration in the first 8 seconds.
2. A circle with centre at the origin has a radius of 6 cm. Jenny is asked to find the equation of the circle. Her answer is . Is she correct? Explain your answer.
3. The graph  is transformed to the graph . Dexter says the transformation is a reflection in the line . Is he correct? Explain your answer.
4. Tilly says that the sketch below shows . Is she correct? Explain your answer.



1. Bradley is asked to find the gradient of a line perpendicular to the one shown in the graph below. His answer is -3. Is he correct? Explain your answer.

*x*

*y*

1. Point A is (-2, 6), point B is (0, 4) and point C is (1, -2).

Do all 3 points satisfy the inequality ?

1. The straight line  goes through the points (*a*, 13) and .

Find the values of *a* and *b*.

1. The straight line  crosses the circle  at two points.

Find the coordinates of these two points.

1. The graph of  has a turning point at (2, 3).

Calculate the values of *b* and *c*.

1. A straight line is drawn from (3, 2) to (7, 14). Find the equation of the perpendicular bisector of this line.
2. A car accelerates at a constant rate from rest, reaching a velocity of 12 m/s after 10 seconds. It then travels at a constant velocity for a further 20 seconds. Calculate the distance travelled during the 30 seconds.

### Answers

1. (2, 0) and (-8, 0)
2. 
3. 
4. B and E
5. Graph 2
6. Point of intersection is (6, 1). Equation is .
7. , , turning point .
8. Area under graph  distance travelled  128 metres.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| *y* | 1.25 | 2.5 | 5 | 10 | 20 | 40 | 80 |

*y*

*x*



1. Acceleration  gradient m/s².
2. Jenny is not correct as the equation is  so therefore .
3. Dexter is not correct. The transformation is a reflection in the line .
4. Tilly is not correct as the *y*-axis intercept is negative and  only has positive *y*-values.
5. The gradient of the line shown is 3. The product of the gradients of two perpendicular lines equals -1, so Bradley is not correct as . The gradient of a line perpendicular to the one shown would be .
6. Point A satisfies the inequality as .

Point B satisfies the inequality as 

Point C does not satisfy the inequality as -2 is not greater than -2; it is equal to it.

1. At (*a*, 13):









At :







1. 





 and 

When , 

When , 

1. 



 and 

1. Gradient of line joining two points  so gradient of perpendicular bisector .

The midpoint is (5, 8).

The equation is  or .

1. The distance travelled is the area under the graph.

Area under graph in first 10 seconds 

Area under graph between 10 and 30 seconds 

Distance travelled  metres

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AO1 | 1 | Identify intercepts of a quadratic graph |  |  |  |  | AO1 | 1 | Identify intercepts of a quadratic graph |  |  |  |
| AO1 | 2 | Find the equation of a perpendicular line |  |  |  |  | AO1 | 2 | Find the equation of a perpendicular line |  |  |  |
| AO1 | 3 | Identify a translation of a given graph |  |  |  |  | AO1 | 3 | Identify a translation of a given graph |  |  |  |
| AO1 | 4 | Identify equations of parallel lines |  |  |  |  | AO1 | 4 | Identify equations of parallel lines |  |  |  |
| AO1 | 5 | Recognise the graph of an exponential function |  |  |  |  | AO1 | 5 | Recognise the graph of an exponential function |  |  |  |
| AO1 | 6 | Find an equation of a perpendicular line |  |  |  |  | AO1 | 6 | Find an equation of a perpendicular line |  |  |  |
| AO1 | 7 | Identify the turning point by completing the square |  |  |  |  | AO1 | 7 | Identify the turning point by completing the square |  |  |  |
| AO1 | 8 | Calculate the area under a graph |  |  |  |  | AO1 | 8 | Calculate the area under a graph |  |  |  |
| AO1 | 9 | Use a table of values to plot an exponential graph |  |  |  |  | AO1 | 9 | Use a table of values to plot an exponential graph |  |  |  |
| AO1 | 10 | Calculate acceleration from a velocity-time graph |  |  |  |  | AO1 | 10 | Calculate acceleration from a velocity-time graph |  |  |  |
| AO2 | 11 | Recognise and use the equation of a circle with centre at the origin |  |  |  |  | AO2 | 11 | Recognise and use the equation of a circle with centre at the origin |  |  |  |
| AO2 | 12 | Identify a reflection of a given graph |  |  |  |  | AO2 | 12 | Identify a reflection of a given graph |  |  |  |
| AO2 | 13 | Recognise properties of a quadratic graph |  |  |  |  | AO2 | 13 | Recognise properties of a quadratic graph |  |  |  |
| AO2 | 14 | Calculate the gradient of a perpendicular line |  |  |  |  | AO2 | 14 | Calculate the gradient of a perpendicular line |  |  |  |
| AO2 | 15 | Identify solutions of linear inequalities in two variables |  |  |  |  | AO2 | 15 | Identify solutions of linear inequalities in two variables |  |  |  |
| AO3 | 16 | Identify points on a straight line with algebra |  |  |  |  | AO3 | 16 | Identify points on a straight line with algebra |  |  |  |
| AO3 | 17 | Solve a problem involving a straight line and a circle |  |  |  |  | AO3 | 17 | Solve a problem involving a straight line and a circle |  |  |  |
| AO3 | 18 | Use a turning point to solve a problem |  |  |  |  | AO3 | 18 | Use a turning point to solve a problem |  |  |  |
| AO3 | 19 | Find the equation of a perpendicular bisector |  |  |  |  | AO3 | 19 | Find the equation of a perpendicular bisector |  |  |  |
| AO3 | 20 | Solve a problem involving a velocity-time graph |  |  |  |  | AO3 | 20 | Solve a problem involving a velocity-time graph |  |  |  |