Coordinate Geometry, Functions and Graphs

Main Concepts

Given two points $A(x_1, y_1)$ and $B(x_2, y_2)$

- Length of line segment $AB = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$
- Gradient of line segment $AB = \frac{y_2 - y_1}{x_2 - x_1}$ or $\frac{y_1 - y_2}{x_1 - x_2}$
- General equation of a straight line is given by:

  $$y = mx + c$$

  Where, $m =$ gradient & $c =$ the y −intercept

- To find the equation of a straight line we need two pieces of information, **the gradient** and a **point** it passes through. (2 points also work as we can find the gradient using the gradient equation)

  2 methods of finding the equation of a straight line:

  $$y = mx + c \text{ or } y - y_1 = m(x - x_1)$$

  Example:
  Given that the line has a gradient of 2 and passes through the point (3,4)

  Using $y = mx + c$,
  Substitute $m = 2, x = 3$ and $y = 4$ into the equation

  $$4 = 2(3) + c$$
  $$c = 4 - 6 = -2$$

  Equation is: $y = 2x - 2$

  Using $y - y_1 = m(x - x_1)$,
  Substitute $m = 2, x_1 = 3$ and $y_1 = 4$ into the equation

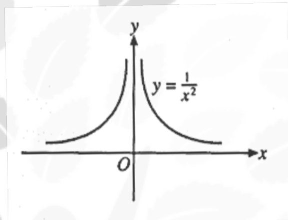
  $$y - 4 = 2(x - 3)$$
  $$y = 2x - 6 + 4 = 2x - 2$$

- When the line passes through the x −axis, $y = 0$
  When the line passes through the y −axis, $x = 0$

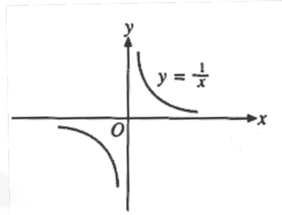
- Parallel lines have the same gradient

General Shapes of Power Functions $y = ax^n$

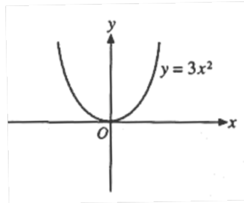
$y = ax^{-2}, a > 0$



$y = ax^{-1}, a > 0$



$y = ax^{2}, a > 0$



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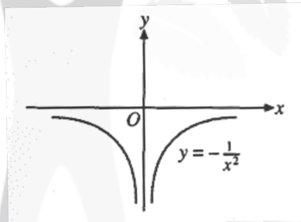

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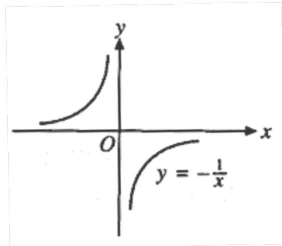
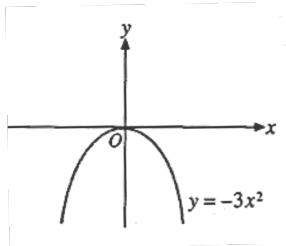
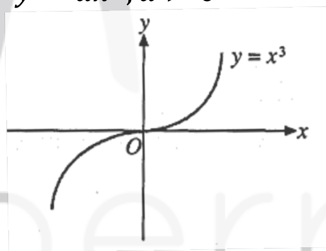


$y = ax^{2}, a < 0$



$y = ax^{3}, a > 0$



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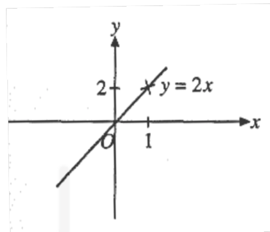

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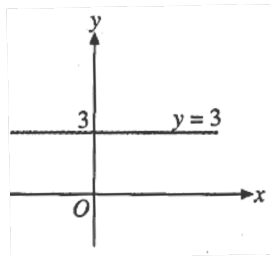
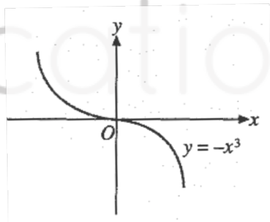


$y = ax^{3}, a < 0$



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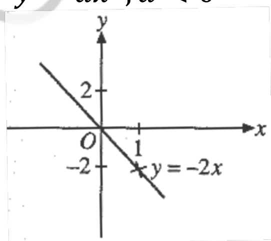

$y = ax^{0}, a < 0$