

Starter

Using the discriminant, $b^2 - 4ac$ find the number of roots of the following equation.

1) $y = 3x^2 - 4x + 2$

2) $y = -5x^2 + 8x - 4$

Solving Discriminant Problems

Today we are learning...

How to solve problems using the discriminant formula.

I will know if I have been successful if...

I can choose suitable values for a, b and c.

I can substitute these into the formula and equate the formula.

I can answer exam questions using the discriminant.



Going Back to a Previous Note...

The wording is important:

- $b^2 - 4ac > 0$ Roots are real and distinct
- $b^2 - 4ac = 0$ Roots are real and equal
- $b^2 - 4ac < 0$ No real roots
- "2 roots" is not accepted

Example 1

Find the value of p given that the equation $y = px^2 - 8x - 16$ has exactly 1 root.

Example 2

Find the range of values for p , given that the equation

$$y = 3x^2 - px + 4$$

has exactly 2 roots.

Example 3

Find the range of values for p , given that the equation

$$y = 2x^2 + 5x + p$$

has exactly 0 roots.

Starter

1) Rearrange this equation to make t the subject.

$$45 - 32t = 9$$

2) Find the value of p such that the equation $y = px^2 - 7x + 10$ has no real roots.

Practice

1) Given that the following parabolas have exactly one root, find the value of p .

a) $y = px^2 + 6x - 7$ b) $y = 4x^2 - 2x + p$

2) Given that the following parabolas have exactly two roots, find the range of values for p .

a) $y = x^2 + px + 8$ b) $y = 2x^2 + 7x - p$

3) Given the the following parabolas have exactly 0 roots, find the range of values for p .

a) $y = 4x^2 - px + 7$ b) $y = x^2 - x + p$

Answers

1) Given that the following parabolas have exactly one root, find the value of p .

a) $p = \frac{-9}{7}$ b) $p = \frac{1}{4}$

2) Given that the following parabolas have exactly two roots, find the range of values for p .

a) $p > \sqrt{32}$ b) $p < \frac{49}{8}$

3) Given the the following parabolas have exactly 0 roots, find the range of values for p .

a) $p < \sqrt{112}$ b) $p > \frac{1}{4}$

Exam Question

MARKS

12. Find the range of values of p such that the equation $px^2 - 2x + 3 = 0$, $p \neq 0$, has no real roots.

4

Mark Scheme

12	<p>Ans: $p > \frac{1}{3}$</p> <ul style="list-style-type: none"> •¹ know to use discriminant •² correct values of a, b and c •³ form correct inequation •⁴ solve inequation 	4	<ul style="list-style-type: none"> •¹ $b^2 - 4ac$ •² $a = p, b = -2, c = 3$ •³ $4 - 12p < 0$ •⁴ $p > \frac{1}{3}$
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Starter

Describe the nature of the roots for each of the following.

a) $y = x^2 + 5x - 9$

b) $y = -2x^2 + 5x - 4$

c) $y = x^2 - 6x + 9$

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Quadratics of the Form $y = kx^2$

Today we are learning...

How to sketch quadratics of the form $y = kx^2$ and find the value of k .

I will know if I have been successful if...

I can construct a table of values.

I can plot the points and join them with a smooth curve.

I can find the value of k to solve the equation.



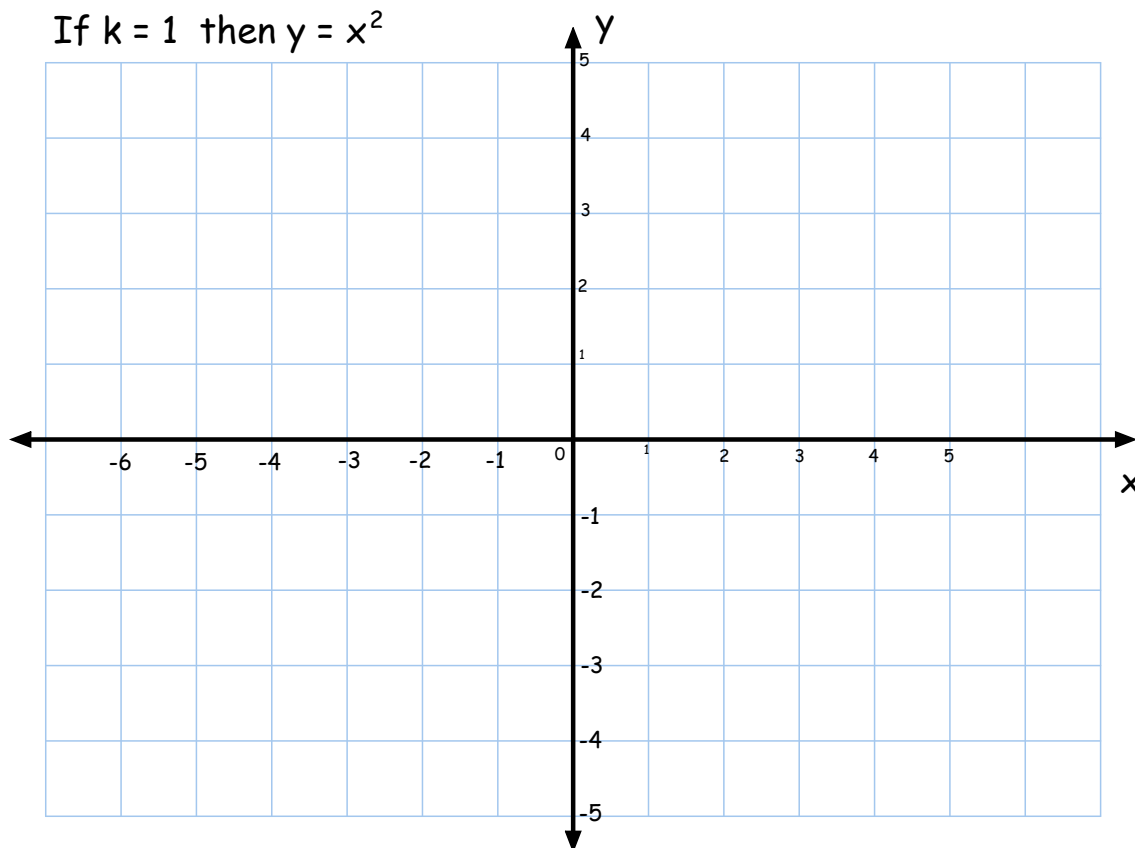
Quadratics of the Form $y = kx^2$

If $k = 1$ then $y = x^2$

x	-2	-1	0	1	2
y					

National 5 WB 3rd September Quadratics Including Discriminant

If $k = 1$ then $y = x^2$



Quadratics of the Form $y = kx^2$

If $k = 2$ then $y = 2x^2$

x	-2	-1	0	1	2
y					

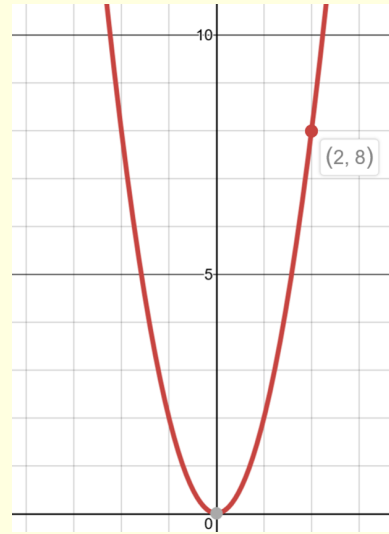
Quadratics of the Form $y = kx^2$

If $k = -2$ then $y = -2x^2$

x	-2	-1	0	1	2
y					

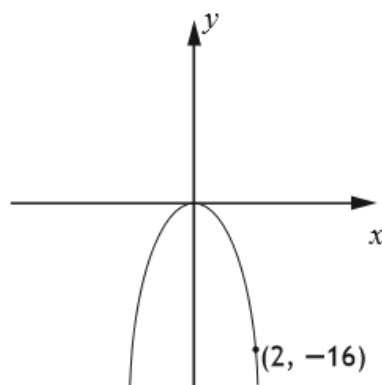
Typical Exam Question

The graph with equation $y = kx^2$ is shown in the diagram.
The point $(2, 8)$ lies on the curve.
Determine the value of k .



Specimen Paper (2 Marks)

4. The graph with equation $y = kx^2$ is shown below.



The point $(2, -16)$ lies on the graph.
Determine the value of k .

Answer

4

Ans: -4

•¹ correct substitution into equation

•² state value of k

2

•¹ $-16 = k \times 2^2$

•² -4