

BRIGIDINE - QUADRATICS TEST - YR10

Year 10 Half Yearly 2007
Stage 5.1 - 5.3 Common
(30 minutes)
Section D

Student: _____

Teacher: _____

Show all necessary working

Neatness may be taken into consideration in the awarding of marks

1. Expand and simplify $(2x-3)^2$ (1 mark)

2. Fully simplify $3\sqrt{54} + 2\sqrt{24}$ (2 marks)

3. Fully simplify $\frac{3}{x^2+4x-5} + \frac{1}{x-1}$ (2 marks)

4. Show that $\frac{6+\sqrt{2}}{2\sqrt{3}}$ can be written like $a\sqrt{3} + b\sqrt{6}$, find "a" and "b" (3 marks)

5. Simplify $\sqrt{16x^{16}}$

(1 mark)

6. Solve these simultaneous equations

$$3x + 4y = 10 \quad (1) \quad (3 \text{ marks})$$

$$x - 5y = -32 \quad (2)$$

7. Solve these quadratic equations *(giving your answers as simple surds)*

a) $2x^2 + 5 = 11x$ (2 marks)

b) $5x^2 + 2x - 1 = 0$. (3 marks)

8. Solve the following quadratic equation by completing the square: (3 marks)

$$x^2 + 7x - 4 = 0 \quad (\text{correct to 2 decimal places})$$

SOLUTIONS

Year 10 Half Yearly 2007
 Stage 5.1 - 5.3 Common
 (30 minutes)
 Section D

Student: _____

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Show all necessary working

Neatness may be taken into consideration in the awarding of marks

1. Expand and simplify $(2x-3)^2$ (1 mark)

$$\begin{aligned} &(2x-3)(2x-3) \\ &= 4x^2 - 6x - 6x + 9 \\ &= 4x^2 - 12x + 9 \end{aligned}$$

2. Fully simplify $3\sqrt{54} + 2\sqrt{24}$ (2 marks)

$$\begin{aligned} &3\sqrt{9 \times 6} + 2\sqrt{4 \times 6} \\ &= 3 \times 3\sqrt{6} + 2 \times 2\sqrt{6} \\ &= 9\sqrt{6} + 4\sqrt{6} \\ &= 13\sqrt{6} \end{aligned}$$

3. Fully simplify $\frac{3}{x^2+4x-5} + \frac{1}{x-1}$ (2 marks)

$$\begin{aligned} &\frac{3}{(x+5)(x-1)} + \frac{1}{(x-1)} \\ &= \frac{3}{(x+5)(x-1)} + \frac{(x+5)}{(x+5)(x-1)} \\ &= \frac{3x+15}{(x+5)(x-1)} = \frac{3(x+5)}{(x+5)(x-1)} = \frac{3}{(x-1)} \end{aligned}$$

4. Show that $\frac{6+\sqrt{2}}{2\sqrt{3}}$ can be written like $a\sqrt{3} + b\sqrt{6}$, find "a" and "b" (3 marks)

$$\begin{aligned} &\frac{\sqrt{3}}{\sqrt{3}} \times \frac{6+\sqrt{2}}{2\sqrt{3}} = a\sqrt{3} + b\sqrt{6} \\ &= \frac{6\sqrt{3} + \sqrt{6}}{6} \\ &= \sqrt{3} + \frac{1}{6}\sqrt{6} \\ &\underline{a=1, b=\frac{1}{6}} \end{aligned}$$

5. Simplify $\sqrt{16x^{16}}$

(1 mark)

$$\sqrt{16x^{16}} = (4x^8)^2$$

$$= 4x^8$$

only 2nd one in the form to get this correct well done.

6. Solve these simultaneous equations

$$3x + 4y = 10 \quad (1) \quad (3 \text{ marks})$$

$$x - 5y = -32 \quad (2)$$

$$(2) \times 3 = 3x - 15y = -96 \quad (3)$$

$$(3) - (1) = -19y = -106$$

$$19y = 106$$

$$y = \frac{106}{19} = 5.58$$

sub y into (2)

$$x - (5 \times 5.58) = -32$$

$$x = -4.1$$

7. Solve these quadratic equations

a) $2x^2 + 5 = 11x$ (2 marks)

$$2x^2 - 11x + 5 = 0$$

$$(2x - 1)(x - 5) = 0$$

$$\downarrow$$

$$2x - 1 = 0$$

$$2x = 1$$

$$x = \frac{1}{2}$$

$$\therefore x = 5$$

$$\downarrow$$

$$x - 5 = 0$$

$$x = 5$$

b) $5x^2 + 2x - 1 = 0$ (3 marks)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-2 \pm \sqrt{2^2 - 4 \times 5 \times -1}}{2 \times 5}$$

$$x = \frac{-2 \pm \sqrt{24}}{10}$$

$$x = \frac{-2 \pm 4\sqrt{24}}{10}$$

8. Solve the following quadratic equation by completing the square: ¹⁰ (3 marks)

$$x^2 + 7x - 4 = 0 \quad (\text{correct to 2 decimal places})$$

$$x^2 + 7x = 4$$

$$x^2 + 7x + \left(\frac{7}{2}\right)^2 = 4 + \left(\frac{7}{2}\right)^2$$

$$(x + 3.5)^2 = 16.25$$

$$x + 3.5 = \pm \sqrt{16.25}$$

$$x = \pm \sqrt{16.25} - 3.5$$

$$x = 0.53, -7.53$$

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