Red Worksheet - Solve the following quadratics using the quadratic formula and match the question to the answer.

Questions:

1) $x^2 + 14x + 24 = 0$

2) $x^2 + 9x + 18 = 0$

3) $x^2 + 7x + 12 = 0$

4) $x^2 + 10x + 21 = 0$

5) $x^2 + 22x + 21 = 0$

6) $x^2 - 15x + 36 = 0$

7) $4x^2 + 3x - 7 = 0$

8) $3x^2 - 16x - 12 = 0$

Answers

$x = -3$ or $x = -7$

$x = -2$ or $x = -12$

$x = 12$ or $x = 3$

$x = -3$ or $x = -6$

$x = 1$ or $x = -1\frac{3}{4}$

$x = 6$ or $x = -\frac{2}{3}$

$x = -3$ or $x = -4$

$x = -1$ or $x = -21$

Amber Worksheet - Solve the following quadratics using the quadratic formula and match the question to the answer. Don't forget to order your equation first.

Questions:

1) $2x^2 + 5x + 2 = 0$

2) $4x^2 + 3x - 7 = 0$

3) $x^2 + 2x - 5 = 0$

4) $1 + 8x + 7x^2 = 0$

5) $22x + 21 + x^2 = 0$

6) $x^2 + 36 - 15x = 0$

7) $- 3 + 8x^2 + 10x = 0$

8) $-1 + 2x + 15x^2 = 0$

Answers

$x = 12$ or $x = 3$

$x = - 21$ or $x = - 1$

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

$x = - 1$ or $x = -\frac{1}{7}$

$x = \frac{1}{5}$ or $x = -\frac{1}{3}$

$x = 1.45$ or $x = -3.45$

$x = 1$ or $x = - 1\frac{3}{4}$

$x = \frac{1}{4}$ or $x = - 1\frac{1}{2}$

Green Worksheet - Solve the following quadratics using the quadratic formula and match the question to the answer. Don't forget to rearrange your equation first.

Questions: Answers

1) $- 16x + 3x^2 - 12 = 0$ $x = 2$

2) $x^2 - 4x - 7 = 0$ No solutions

3) $4x^2 + 8x = 96$ $x = -1.32$ or $x = 5.32$

4) $7x^2 + 10 = 37x$ $x = 6$ or $x = -\dfrac{2}{3}$

5) $x^2 + 2x - 5 = 0$ $x = -\dfrac{5}{2}$

6) $- 4x = - x^2 - 4$ $x = -6$ or $x = 4$

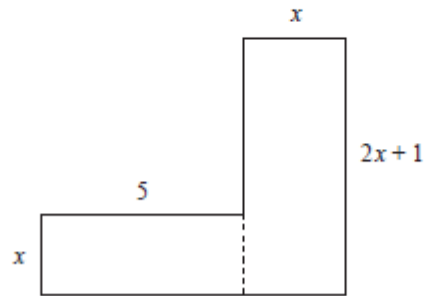7) $4x^2 + 20x = -25$ $x = \dfrac{2}{7}$ or $x = 5$

8) $2x^2 + 5x + 4 = 0$ $x = 1.45$ or $x = -3.45$

Extension 1

1. The diagram below shows a 6-sided shape.
   All the corners are right angles.
   All the measurements are given in centimetres.

Diagram **NOT**
accurately drawn

x

$2x + 1$

5

x

The area of the shape is $95\,\text{cm}^2$.

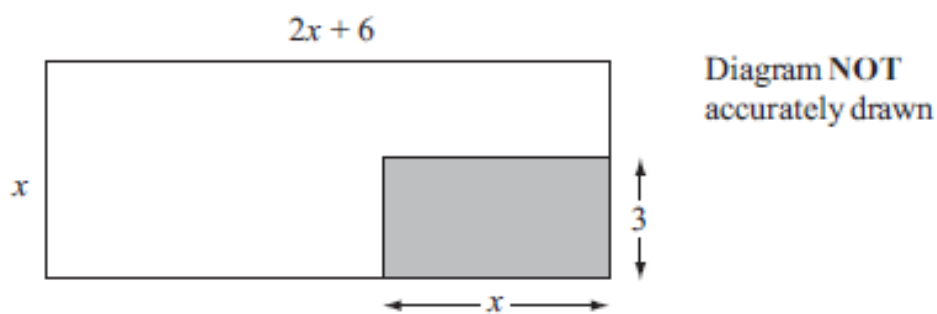(a) Show that $\qquad\qquad 2x^2 + 6x - 95 = 0$

(3)

(b) Solve the equation

$$2x^2 + 6x - 95 = 0$$

Why aren't both solutions to the quadratic appropriate for this problem?

8 . The diagram below shows a large rectangle of length $(2x + 6)$ cm and width x cm.

A smaller rectangle of length x cm and width 3 cm is cut out and removed.

$2x + 6$

Diagram **NOT** accurately drawn

x

3

x

The area of the shape that is left is 100 cm².

(a) Show that $2x^2 + 3x - 100 = 0$

(b) Calculate the length of the smaller rectangle.
Give your answer correct to 3 significant figures.
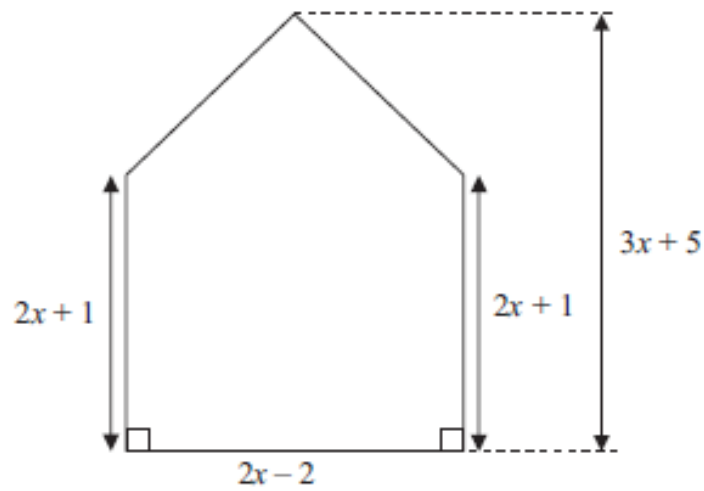
*14 The diagram shows a pentagon.

Diagram **NOT** accurately drawn

$3x + 5$

$2x + 1$

$2x + 1$

$2x - 2$

All measurements are in centimetres.

Show that the area of this pentagon can be written as $5x^2 + x - 6$

If the area of the pentagon is 42cm^2 find an appropriate value for x.

Extension 2

1) Where did they go wrong?

Find as many mistakes as you can in this answer to the solution of

$2x^2 - 4x - 3 = 0$

Model Answer:

$$x = \frac{-4 \pm \sqrt{-16 - 24}}{2} = \frac{-4 \pm \sqrt{+40}}{2} = -2 \pm \sqrt{20} = -2 \pm 10$$

$which\ gives\ x = \ 8\ or - 12$

2) Find the discriminant of each of the quadratic equations on the green task sheet (the discriminant is just the section of the formula that lies under the square root – i.e. $b^2 - 4ac$)

Equation	Discriminant (b^2-4ac)	Solutions (from task sheet)
- 16x + 3x^2 - 12 = 0		
$x^2 - 4x - 7 = 0$		
4x^2 + 8x = 96		
7x^2 + 10 = 37x		
x^2 + 2x - 5 = 0		
x^2 + 2x - 5 = 0		
4x^2 + 20x = -25		
2x^2 + 5x + 4 = 0		

3) Looking closely at the discriminant of the equation and the solutions to the equation what links can you see between the discriminant and the number (or sort) of the solutions you get?

Why do you think this is?

4) Using the discriminant and your findings above, decide how many solutions each of these equations would have:

1. $2x^2 + 8x + 2 = 0$

2. $3x^2 - x + 10 = 0$

3. $2x^2 + 4x + 2 = 0$

Additional Support Cards

Red Set	Red Set	Red Set
a=1, b=7 and c=12	a=1, b=7 and c=12	a=1, b=7 and c=12
a=1, b=22 and c=21	a=1, b=22 and c=21	a=1, b=22 and c=21
a=3, b=-16 and c=-12	a=3, b=-16 and c=-12	a=3, b=-16 and c=-12
a=1, b=14 and c=24	a=1, b=14 and c=24	a=1, b=14 and c=24
a=1, b=10 and c=21	a=1, b=10 and c=21	a=1, b=10 and c=21
a=4, b=3 and c=-7	a=4, b=3 and c=-7	a=4, b=3 and c=-7
a=1, b=9 and c=18	a=1, b=9 and c=18	a=1, b=9 and c=18
a=1, b=-15 and c=36	a=1, b=-15 and c=36	a=1, b=-15 and c=36

Additional Support Cards

Amber Set	Amber Set	Amber Set
a=1, b=2 and c=-5	a=1, b=2 and c=-5	a=1, b=2 and c=-5
a=1, b=22 and c=21	a=1, b=22 and c=21	a=1, b=22 and c=21
a=15, b=2 and c=-1	a=15, b=2 and c=-1	a=15, b=2 and c=-1
a=2, b=5 and c=2	a=2, b=5 and c=2	a=2, b=5 and c=2
a=7, b=8 and c=1	a=7, b=8 and c=1	a=7, b=8 and c=1
a=8, b=-10 and c=-3	a=8, b=-10 and c=-3	a=8, b=-10 and c=-3
a=4, b=3 and c=-7	a=4, b=3 and c=-7	a=4, b=3 and c=-7
a=1, b=-15 and c=36	a=1, b=-15 and c=36	a=1, b=-15 and c=36

Additional Support Cards

Green Set	Green Set	Green Set
a=4, b=8 and c=-96	a=4, b=8 and c=-96	a=4, b=8 and c=-96
a=1, b=2 and c=-5	a=1, b=2 and c=-5	a=1, b=2 and c=-5
a=2, b=5 and c=4	a=2, b=5 and c=4	a=2, b=5 and c=4
a=3, b=-16 and c=-12	a=3, b=-16 and c=-12	a=3, b=-16 and c=-12
a=7, b=-37 and c=10	a=7, b=-37 and c=10	a=7, b=-37 and c=10
a=4, b=20 and c=25	a=4, b=20 and c=25	a=4, b=20 and c=25
a=1, b=-4 and c=-7	a=1, b=-4 and c=-7	a=1, b=-4 and c=-7
a=1, b=-4 and c=4	a=1, b=-4 and c=4	a=1, b=-4 and c=4