

Name:

Date:

## Solving Quadratic Equations by Factorisation

1. Solve the following quadratic equations.

- (a)  $x^2 + x - 12 = 0$       (b)  $x^2 - 2x - 15 = 0$       (c)  $x^2 + 4x - 12 = 0$   
(d)  $x^2 + 6x = 0$       (e)  $3x^2 - 4x = 0$       (f)  $4x^2 - 9x = 0$   
(g)  $x^2 - 9 = 0$       (h)  $x^2 - 49 = 0$       (i)  $9x^2 - 64 = 0$   
(j)  $x^2 - 8x + 16 = 0$       (k)  $x^2 + 10x + 25 = 0$       (l)  $x^2 - 3x - 18 = 0$   
(m)  $x^2 - 11x + 28 = 0$       (n)  $x^2 + x - 30 = 0$       (o)  $x^2 - 14x + 40 = 0$   
(p)  $2x^2 + 7x + 3 = 0$       (q)  $2x^2 + 5x - 12 = 0$       (r)  $3x^2 - 7x + 4 = 0$   
(s)  $4x^2 + x - 3 = 0$       (t)  $2x^2 + 5x - 3 = 0$       (u)  $2x^2 - 19x + 35 = 0$

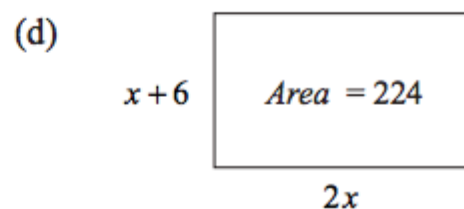
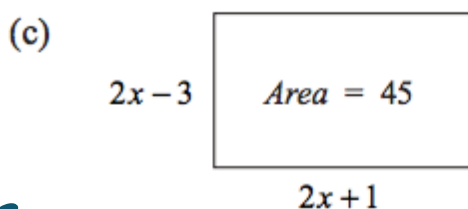
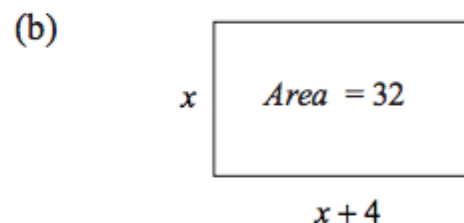
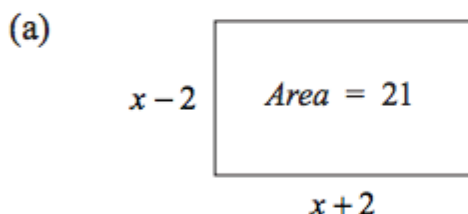
2. The equations of a number of curves are given below. Find where each curve crosses the  $x$ -axis and use this to draw a sketch of the curve.

- (a)  $y = x^2 + 6x + 9$       (b)  $y = x^2 - 4$   
(c)  $y = 2x^2 - 3x$       (d)  $y = x^2 + x - 12$

3. Use the difference of two squares result to solve the following equations.

- (a)  $x^4 - 16 = 0$       (b)  $x^4 - 625 = 0$       (c)  $x^6 - 1 = 0$

4. Find the lengths of each side of the rectangles given below.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

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5. The height of a ball thrown straight up from the ground into the air at time,  $t$ , is given by

$$h = 8t - 10t^2.$$

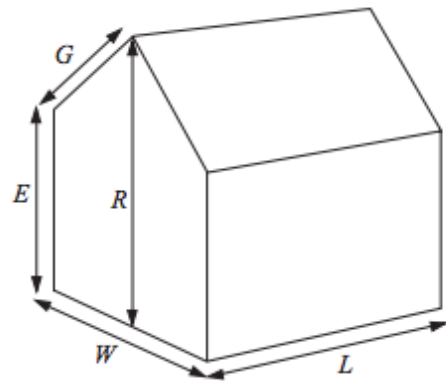
Find the time it takes for the ball to go up and fall back to ground level.

6. The diagram represents a greenhouse.

The volume of the greenhouse is given by the formula

$$V = \frac{1}{2}LW(E + R).$$

- (a) Make  $L$  the subject of the formula, giving your answer as simply as possible.



The surface area,  $A$ , of the greenhouse, is given by the formula

$$A = 2GL + 2EL + W(E + R),$$

where  $V = 500$ ,  $A = 300$ ,  $E = 6$  and  $G = 4$ .

- (b) By substituting these values into the equations for  $V$  and  $A$  show that  $L$  satisfies the equation

$$L^2 - 15L + 50 = 0.$$

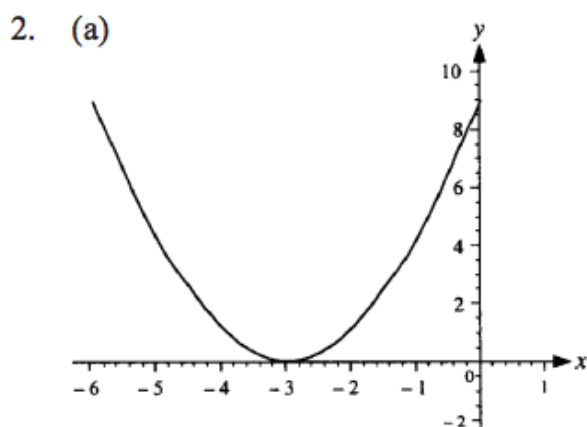
Make the steps in your working clear.

- (c) Solve the equation  $L^2 - 15L + 50 = 0$ .

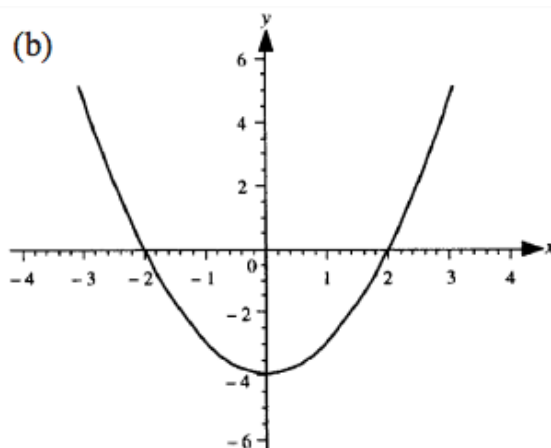
# Solving Quadratic Equations by Factorisation

## Answers

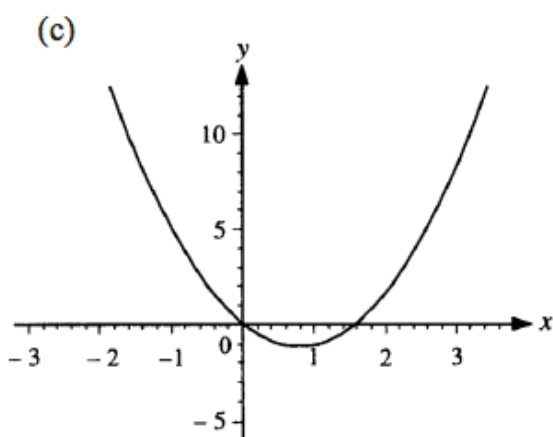
1. (a)  $x = -4$  or  $3$       (b)  $x = 5$  or  $-3$       (c)  $x = -6$  or  $2$       (d)  $x = 6$  or  $0$   
(e)  $x = 0$  or  $\frac{4}{3}$       (f)  $x = 0$  or  $\frac{9}{4}$       (g)  $x = 3$  or  $-3$       (h)  $x = 7$  or  $-7$   
(i)  $x = \frac{8}{3}$  or  $-\frac{8}{3}$       (j)  $x = 4$  (both answers)      (k)  $x = -5$  (both answers)  
(l)  $x = 6$  or  $-3$       (m)  $x = 4$  or  $7$       (n)  $x = 6$  or  $-5$       (o)  $x = 10$  or  $4$   
(p)  $x = -3$  or  $-\frac{1}{2}$       (q)  $x = \frac{3}{2}$  or  $-4$       (r)  $x = 1$  or  $\frac{4}{3}$   
(s)  $x = \frac{3}{4}$  or  $-1$       (t)  $x = \frac{1}{2}$  or  $-3$       (u)  $x = 7$  or  $\frac{5}{2}$



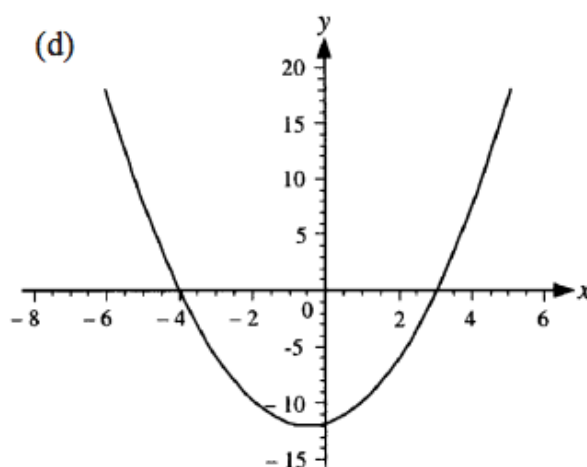
The curve touches the  $x$ -axis at the point where  $x = -3$ .



The curve cuts the  $x$ -axis at the points where  $x = 2$  and  $x = -2$ .



The curve cuts the  $x$ -axis at the points where  $x = 0$  and  $x = \frac{3}{2}$ .



The curve cuts the  $x$ -axis at the points where  $x = 3$  and  $x = -4$ .

# Solving Quadratic Equations by Factorisation

## Answers

3. (a)  $(x^2 + 4)(x + 2)(x - 2) = 0$ , so  $x = -2$  or  $2$

(b)  $(x^2 + 25)(x + 5)(x - 5) = 0$ , so  $x = -5$  or  $5$

(c)  $(x^3 + 1)(x^3 - 1) = 0$ ,  $(x^3 + 1)(x - 1)(x^2 + x + 1) = 0$ ,  
 $(x + 1)(x^2 - x + 1)(x - 1)(x^2 + x - 1) = 0$ , so  $x = -1$  or  $1$

4. (a)  $x = 5$       (b)  $x = 4$       (c)  $x = 4$       (d)  $x = 8$

5.  $t = 0.8$       6. (a)  $L = \frac{2V}{W(E + R)}$       (c)  $L = 5$  or  $L = 10$