Factorize the Difference of two squares.

11 February 2019   09:08

Expressions in the form $ax^2 + bx$

Perfect squared numbers

$1^2 \quad 2^2 \quad 3^2 \quad 4^2 \quad 5^2 \quad 6^2$

$= 1 \quad 4 \quad 9 \quad 16 \quad 25 \quad 36$

Eg Factorize
$5x^2 + 10x$
HCF $5x$
$5x(x+2)$

Factorize $x^2 - y^2$
— the brackets must have the same values but different sign.

$(x + y)(x - y)$

HCF = 2 $2x^2 + 4x + 8$

$2(x^2 + 2x + 4)$

HCF = 3x $3x^3 + 9x^2 + 18x$

$3x(x^2 + 3x + 6)$

DOTS $16x^2 - 25y^2$

$(4x + 5y)(4x - 5y)$

DOTS $100x^2 - 64y^2$

$(10x - 8y)(10x + 8y)$
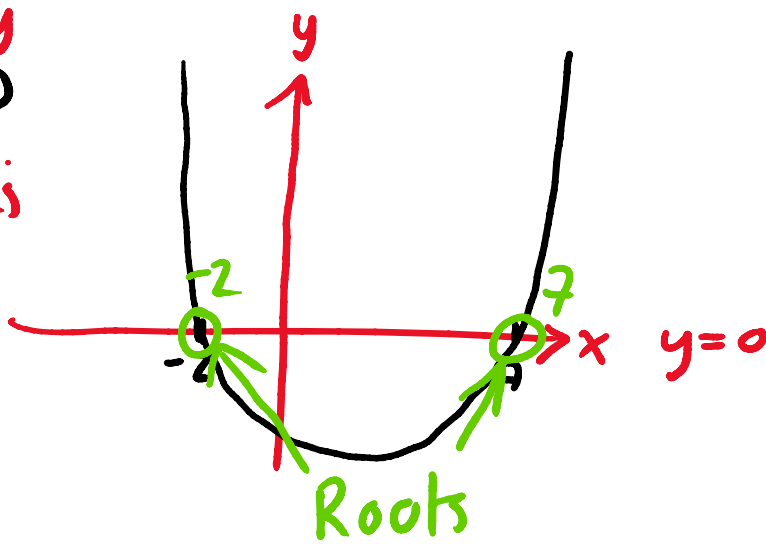
Classwork pg 27
   Q 22 → 36

Solving Quadratic Equations from factors.

Solving $f(x) = x^2 - 5x - 14 = 0$

Finding the roots of the equations where it cuts the x-axis.

$x^2 - 5x - 14 = 0$

$(x + 2)(x - 7)$ $\begin{array}{c} -7x \\ + 2x \\ \hline -5x \end{array}$

$(x+2)(x-7) = 0$ make two equations equal to 0 Solve for X
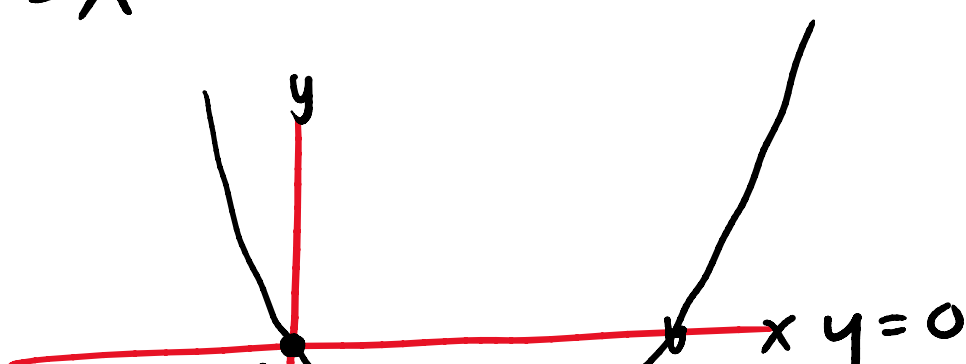
$x+2 = 0$ $x - 7 = 0$
$-2 \mid x = -2 \mid -2 \quad +7 \mid x = 7 \mid +7$
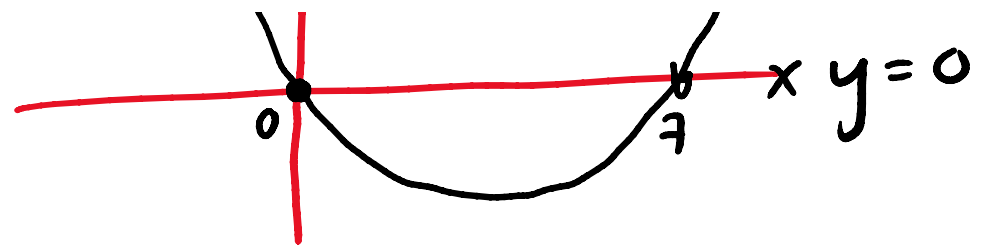
Eg2) solve for X
   $x^2 - 7x = 0$ HCF = X

$x(x - 7) = 0$ X = 0

$x - 7 = 0$

Homework.
Pg 28

Q1 → 7

$x - 7 = 0$

$+7 \mid x = 7 \mid +7$

$y = 0$

T&T3 2.2

PROJECT MATHS

Text & Tests

Leaving 3 Certificate

chapter

1

Algebra 1

Section 2.2 Using factors to solve quadratic equations

27

Take the equation $x^2 - 5x + 6 = 0$.

When $x = 2$, then $x^2 - 5x + 6$ becomes

$(2)^2 - 5(2) + 6$, i.e., $4 - 10 + 6 = 0$

When $x = 3$, then $x^2 - 5x + 6$ becomes

$(3)^2 - 5(3) + 6$, i.e., $9 - 15 + 6 = 0$

When $x = 2$ or $x = 3$, both sides of the equation are zero.

When this happens, we say that $x = 2$ and $x = 3$ are **solutions** or **roots** of the equation.

Solving a quadratic equation involves finding the values of x which satisfy the equation.

When a quadratic equation is in the form $ax^2 + bx + c = 0$, we express the left-hand side as the product of two linear factors and then solve the equation, as shown in the following examples.

27

Example 1

Solve the equation $x^2 - 5x - 14 = 0$.

27

Example 2

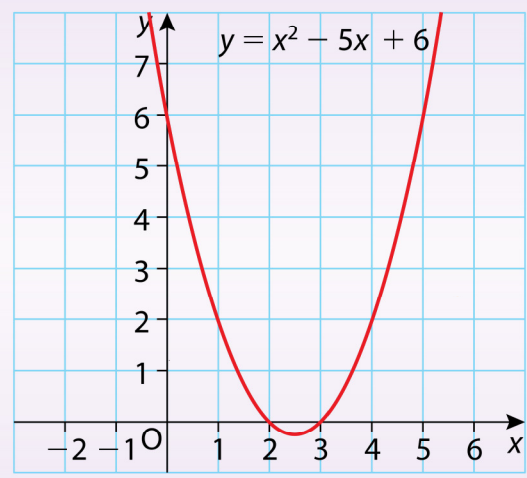Solve these equations:

(i) $2x^2 - 9x = 0$ (ii) $4x^2 - 25 = 0$

27

Notes

Discovery

The curve on the right is called a **parabola**.
It is the graph of $y = x^2 - 5x + 6$.

> Can you use the graph to solve the equation $x^2 - 5x + 6 = 0$?
> Factorise $x^2 - 5x + 6$ and then solve the equation $x^2 - 5x + 6 = 0$.
> What are the links between your answers and the graph?

$y = x^2 - 5x + 6$

28

Exercise 2.2

Solve each of the following equations:

1. $(x - 4)(x + 1) = 0$

28

Exercise 2.2

Solve each of the following equations:

2. $(2x - 1)(3x + 6) = 0$

28

Solve each of the following equations:

3. $x(2x - 5) = 0$

28

Solve each of the following equations:

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

28

Solve each of the following equations:

5. $x^2 - 8x + 12 = 0$

28

Solve each of the following equations:

6. $x^2 - 4x - 5 = 0$

28

Solve each of the following equations:

7. $x^2 - 2x - 8 = 0$

28

Solve each of the following equations:

8. $x^2 + 2x - 15 = 0$

28

Solve each of the following equations:

9. $2x^2 - 5x + 2 = 0$

28

Solve each of the following equations:

10. $6x^2 - x - 2 = 0$

28

Solve each of the following equations:

11. $4x^2 - 29x + 7 = 0$

28

Solve each of the following equations:

12. $9x^2 - 9x - 28 = 0$

28

Solve each of the following equations:

13. $4x^2 - 12x + 5 = 0$

28

Solve each of the following equations:

14. $3x^2 - 13x - 10 = 0$

28

Solve each of the following equations:

15. $6x^2 + 17x - 3 = 0$

28

Solve each of the following equations:

16. $x^2 - 7x = 0$

28

Solve each of the following equations:

17. $2x^2 - 5x = 0$

28

Solve each of the following equations:

18. $3x^2 + 4x = 0$

28

Solve each of the following equations:

19. $2x^2 - 9x = 0$

28

Solve each of the following equations:

20. $3x^2 + 10x = 0$

28

18. $3x^2 + 4x = 0$

Solve each of the following equations:

21. $5x^2 - 12x = 0$

28

Solve each of the following equations:

22. $x^2 - 9 = 0$

28

Solve each of the following equations:

23. $x^2 - 49 = 0$

28

Solve each of the following equations:

24. $4x^2 - 9 = 0$

28

Solve each of the following equations:

25. $4x^2 - 25 = 0$

28

Solve each of the following equations:

26. $9x^2 - 16 = 0$

28

Solve each of the following equations:

27. $4x^2 - 1 = 0$

28

Solve each of the following equations:

28. $(x - 3)(x - 2) = 20$

28

Solve each of the following equations:

29. $(2x - 5)(x - 2) = 15$

28

Solve each of the following equations:
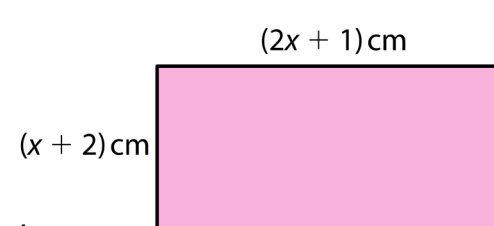
30. $2x(x - 2) = 3(x + 10)$

28

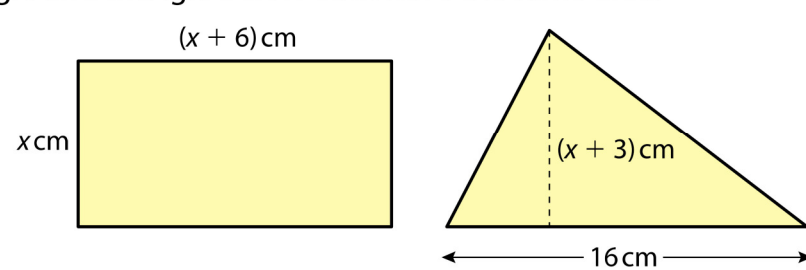**31.** (i) Show that the area of this rectangle in cm^2 is equivalent to $2x^2 + 5x + 2$.

(ii) If the area of the rectangle is 14 cm^2,
    (a) form an equation in x and solve it.
    (b) write down the length and width of the rectangle.

$(2x + 1)$ cm

$(x + 2)$ cm

28

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32. The rectangle and triangle below each have the same area.

$(x + 6)$ cm

x cm

$(x + 3)$ cm

16 cm

(i) Write an expression in x for
    (a) the area of the rectangle
    (b) the area of the triangle.

(ii) Form an equation and solve it to find the value of x.
    Hence find the dimensions of the rectangle.
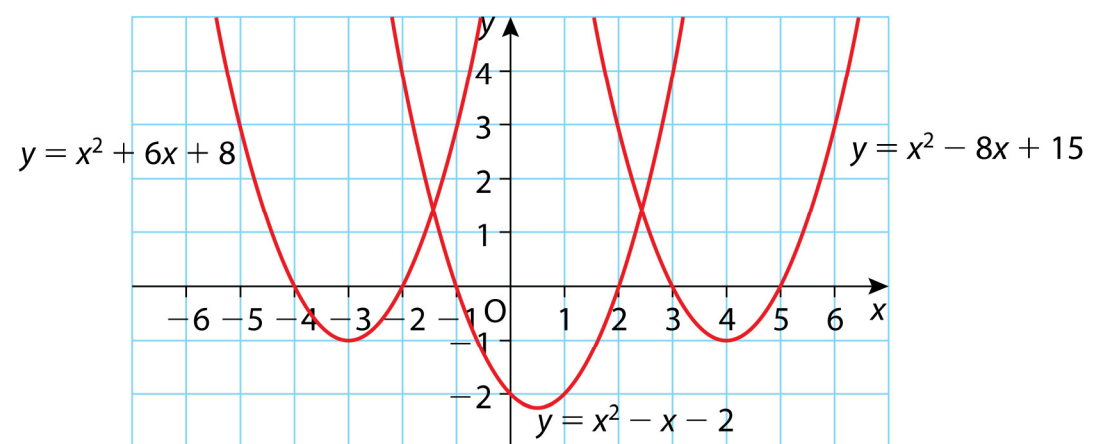   Why did you take only one value for x?

29

33. In the given right-angled triangle, the lengths of the scales are given.

    (i) Use the theorem of Pythagoras to write down an equation in x.

    (ii) Solve this equation.

    (iii) Write down the length of [AB].

$(3x + 4)\,\text{cm}$ $(x + 2)\,\text{cm}$ $(2x + 6)\,\text{cm}$

29

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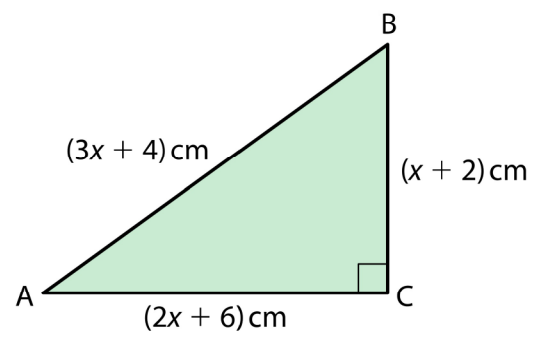
34. Three parabolas are shown here.

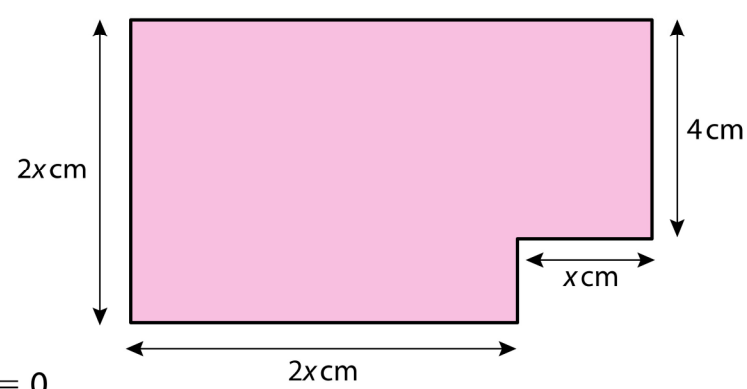$y = x^2 + 6x + 8$ $y = x^2 - 8x + 15$ $y = x^2 - x - 2$

Use the graphs above to solve the following equations (each has two solutions).

(i) $x^2 - 8x + 15 = 0$ (ii) $x^2 + 6x + 8 = 0$ (iii) $x^2 - x - 2 = 0$

29

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35. The diagram shows a shape in which all the corners are right angles. The area of the shape is $48\,\text{cm}^2$.

    (i) Form an equation, in terms of x, for the area of the shape. Show that the equation can be simplified to $x^2 + x - 12 = 0$.

    (ii) Solve the equation $x^2 + x - 12 = 0$ and hence calculate the perimeter of the shape.

$2x\,\text{cm}$ $4\,\text{cm}$ $x\,\text{cm}$ $2x\,\text{cm}$

29

1. $x = 4$ or $x = -1$
2. $x = \frac{1}{2}$ or $x = -2$
3. $x = 0$ or $x = \frac{5}{2}$
4. $x = -1$ or $x = 3$
5. $x = 2$ or $x = 6$
6. $x = -1$ or $x = 5$
7. $x = -2$ or $x = 4$
8. $x = 3$ or $x = -5$
9. $x = \frac{1}{2}$ or $x = 2$
10. $x = \frac{2}{3}$ or $x = -\frac{1}{2}$
11. $x = \frac{1}{4}$ or $x = 7$
12. $x = -\frac{4}{3}$ or $x = \frac{7}{3}$
13. $x = \frac{1}{2}$ or $x = \frac{5}{2}$
14. $x = -\frac{2}{3}$ or $x = 5$

Answers