AQA Level 2 Further mathematics Further algebra

Section 1: Equations

Section test

In Questions 1 to 4, solve the equations.

1) $3x+2=x-5$

(a) x = -7
(b) x = -3.5
(c) x = -3
(d) x = -1.5
(e) I don't know

2) $1-x=5x-3$

(a) $x=\frac{1}{2}$
(b) $x=\frac{2}{3}$
(c) x = 1
(d) $x=-\frac{1}{2}$
(e) I don't know

3) $1-2(y+3)=5(2-y)$

(a) y = 1
(b) $y=\frac{15}{7}$
(c) $y=\frac{17}{3}$
(d) y = 5
(e) I don't know

4) $\frac{a-2}{3}=\frac{1-a}{2}$

(a) a = 1.4
(b) a = -7
(c) a = -1
(d) a = 0.2
(e) I don't know

5) A football club has played 15 matches so far this season. They score 3 points for a win, 1 point for a draw and 0 points for a loss. They have lost 4 matches, and their points score is 27. How many matches have they won?

(a) 3
(b) 4
(c) 8
(d) 11
(e) I don't know

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6) The solutions of the equation $x^2 + 2x - 5 = 0$ are

(a) no real solutions
(b) $-1 \pm \sqrt{6}$
(c) $-1 \pm \sqrt{12}$
(d) $-1 \pm \sqrt{24}$
(e) I don't know

7) The solutions of the equation $2x^2 - 11x + 15 = 0$ are

(a) no real solutions
(b) 1.5 and 5
(c) $\frac{11 \pm \sqrt{241}}{4}$
(d) 2.5 and 3
(e) I don't know

8) The solutions of the equation $3x^2 - 2x + 4 = 0$ are

(a) no real solutions
(b) 2 and $\frac{2}{3}$
(c) $\frac{1 \pm \sqrt{13}}{3}$
(d) $\frac{1 \pm \sqrt{11}}{3}$
(e) I don't know

9) The solutions of the equation $2x^2 + 5x - 4 = 0$ are

(a) $\frac{5 \pm \sqrt{57}}{4}$
(b) $\frac{5 \pm \sqrt{7}}{4}$
(c) $\frac{-5 \pm \sqrt{57}}{4}$
(d) $\frac{-5 \pm \sqrt{7}}{4}$
(e) I don't know

10) A rectangle has length $(3x - 1)$ cm and width $(x + 3)$ cm. The area of the rectangle is 65 cm². What is the value of x?

(a) 3.61 or -6.28
(b) 3.61
(c) 6.28
(d) -3.61 or 6.28
(e) I don't know

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Solutions to section test

1) The correct answer is (b)

$3x + 2 = x - 5$
$2x + 2 = -5$
$2x = -7$
$x = -3.5$

2) The correct answer is (b)

$1 - x = 5x - 3$
$1 = 6x - 3$
$4 = 6x$
$x = \frac{2}{3}$

3) The correct answer is (d)

$1 - 2(y + 3) = 5(2 - y)$
$1 - 2y - 6 = 10 - 5y$
$-2y - 5 = 10 - 5y$
$3y - 5 = 10$
$3y = 15$
$y = 5$

4) The correct answer is (a)

$$\frac{a-2}{3} = \frac{1-a}{2}$$
$2(a - 2) = 3(1 - a)$
$2a - 4 = 3 - 3a$
$5a - 4 = 3$
$5a = 7$
$a = 1.4$

5) The correct answer is (c)

Let w be the number of matches they have won.
They have played 15 and lost 4, so the number of draws $= 15 - 4 - w$
$= 11 - w$

Total points scored $= 3w + 1(11 - w)$

$= 3w + 11 - w$

$= 2w + 11$

Therefore $2w + 11 = 27$

$2w = 16$

$w = 8$

They have won 8 matches.

6) The correct answer is (b)

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

$a = 1, \quad b = 2, \quad c = -5$

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

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

$$= \frac{-2 \pm \sqrt{4} \times \sqrt{6}}{2}$$

$$= \frac{-2 \pm 2\sqrt{6}}{2}$$

$= -1 \pm \sqrt{6}$

7) The correct answer is (d)

$2x^2 - 11x + 15 = 0$

$2x^2 - 5x - 6x + 15 = 0$

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

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

$x = 3$ or $\frac{5}{2}$

8) The correct answer is (a)

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

$a = 3, \quad b = -2, \quad c = 4$

$b^2 - 4ac = (-2)^2 - 4 \times 3 \times 4 = 4 - 48 = -44$

There are no real solutions.

9) The correct answer is (c)

$2x^2 + 5x - 4 = 0$

$a = 2, \quad b = 5, \quad c = -4$

$$x = \frac{-5 \pm \sqrt{57}}{2 \times 2} = \frac{-5 \pm \sqrt{57}}{4}$$

10) The correct answer is (b)

The area of the rectangle is $(3x - 1)(x + 3)$

$(3x - 1)(x + 3) = 65$

$3x^2 + 8x - 3 = 65$

$3x^2 + 8x - 68 = 0$

$$x = \frac{-8 \pm \sqrt{8^2 - 4 \times 3 \times -68}}{2 \times 3}$$

$$= \frac{-8 \pm \sqrt{880}}{6}$$

$= 3.61$ or -6.28

Since the lengths of the sides must be positive, $x = 3.61$.