AQA Level 2 Further mathematics Further algebra

Section 3: Inequalities and indices

Section test

1) Solve the inequality $4x + 1 \geq x - 8$

(a) $x \geq \frac{7}{3}$
(b) $x \leq -3$
(c) $x \geq -3$
(d) $x \leq \frac{7}{3}$
(e) I don't know

2) Solve the inequality $\frac{x+1}{2} \leq \frac{2-x}{3}$

(a) $x \leq \frac{1}{5}$
(b) $x \geq 1$
(c) $x \geq \frac{1}{5}$
(d) $x \leq 1$
(e) I don't know

3) The largest value of x which satisfies the inequality $2(1-2x) - x > 3(x+1) + 7$ is

(a) –2
(b) –1
(c) 2
(d) 1
(e) I don't know

4) $x^2 - 5x + 4 < 0$

(a) 1, 2, 3 and 4
(b) - 2 and -3
(c) -4, -3, -2 and -1
(d) 2 and 3
(e) I don't know

5) $8 + 2x - x^2 < 0$

(a) $-2 < x < 4$
(b) $x < -2$ or $x > 4$
(c) $x < -4$ or $x > 2$
(d) $-4 < x < 2$
(e) I don't know

6) $6x^2 + x - 2 \geq 0$

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

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7) $27^{2/3} =$

(a) $\frac{1}{18}$

(b) 18

(c) $\frac{1}{9}$

(d) 9

(e) I don't know

8) $\left(\frac{4}{25}\right)^{-3/2} =$

(a) $-\frac{125}{8}$

(b) $\frac{8}{125}$

(c) $\frac{125}{8}$

(d) $-\frac{8}{125}$

(e) I don't know

9) The expression $3a^2b \times (2ab^{-2})^3 \div 4ab^2$ can be simplified to give the expression

(a) $\frac{6a^4}{b^7}$

(b) $\frac{6a^4}{b^{5/2}}$

(c) $\frac{20a^4}{b^7}$

(d) $\frac{20a^4}{b^{5/2}}$

(e) I don't know

10) Simplify $8^3 \times 6^{1/2} \div 32^{3/2}$

(a) $4\sqrt{3}$

(b) $2\sqrt{3}$

(c) $3\sqrt{2}$

(d) $4\sqrt{2}$

(e) I don't know

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Solutions to section test

1) The correct answer is (c)

$4x + 1 \geq x - 8$

$3x + 1 \geq -8$

$3x \geq -9$

$x \geq -3$

2) The correct answer is (a)

$\frac{x+1}{2} \leq \frac{2-x}{3}$

$3(x+1) \leq 2(2-x)$

$3x + 3 \leq 4 - 2x$

$5x + 3 \leq 4$

$5x \leq 1$

$x \leq \frac{1}{5}$

3) The correct answer is (a)

$2(1-2x) - x > 3(x+1) + 7$

$2 - 4x - x > 3x + 3 + 7$

$2 - 5x > 3x + 10$

$2 > 8x + 10$

$-8 > 8x$

$-1 > x$

$x < -1$

The largest integer value which satisfies the equation is -2.

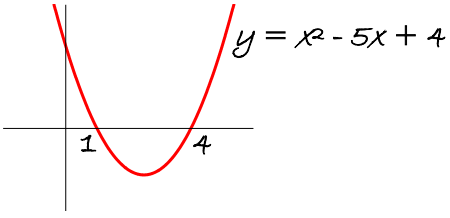
4) The correct answer is (d)

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

$(x-1)(x-4) < 0$

From graph, $1 < x < 4$

The integer solutions are 2 and 3.



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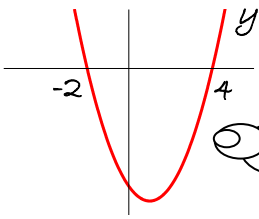
5) The correct answer is (b)

$8 + 2x - x^2 < 0$

$x^2 - 2x - 8 > 0$

$(x - 4)(x + 2) > 0$

From graph, $x < -2$ or $x > 4$.



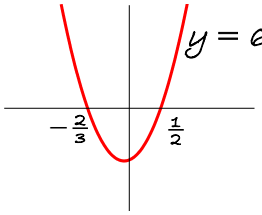
If you use the original inequality, the graph will be the other way up and you will be looking for the parts below the x-axis.

6) The correct answer is (c)

$6x^2 + x - 2 \geq 0$

$(3x + 2)(2x - 1) \geq 0$

From graph, $x \leq -\frac{2}{3}$ or $x \geq \frac{1}{2}$



7) The correct answer is (d)

$27^{2/3} = \left(\sqrt[3]{27}\right)^2 = 3^2 = 9$

8) The correct answer is (c)

$$\left(\frac{4}{25}\right)^{-3/2} = \left(\frac{25}{4}\right)^{3/2} = \left(\sqrt{\frac{25}{4}}\right)^3 = \left(\frac{5}{2}\right)^3 = \frac{125}{8}$$

9) The correct answer is (a)

$$3a^2b \times (2ab^{-2})^3 \div 4ab^2 = \frac{3a^2b \times 8a^3b^{-6}}{4ab^2}$$

$$= \frac{24a^5b^{-5}}{4ab^2} = 6a^4b^{-7} = \frac{6a^4}{b^7}$$

10) The correct answer is (a)

$$8^3 \times 6^{1/2} \div 32^{3/2} = (2^3)^3 \times (2 \times 3)^{1/2} \div (2^5)^{3/2}$$

$$= 2^9 \times 2^{1/2} \times 3^{1/2} \div 2^{15/2}$$

$$= 2^{9 + \frac{1}{2} - \frac{15}{2}} \times 3^{1/2}$$

$$= 2^2 \times 3^{1/2}$$

$$= 4\sqrt{3}$$