AQA Level 2 Further mathematics Further algebra

Section 3: Inequalities and indices

Exercise

1. Solve the following linear inequalities.

(i) $2x+3<10$ (ii) $5x+3\geq 2x-9$

(iii) $4x+1\leq 6x-7$ (iv) $5(x-3)\leq 2(2x+3)$

(v) $4(2x+5)\geq 3(3x-1)$ (vi) $\frac{2x+1}{3}>\frac{x-4}{2}$

2. (i) What is the smallest integer value that satisfies the inequality $3x-1>7-x$?

(ii) What is the largest integer value that satisfies the inequality $2(1-x)>3x+4$?

3. Solve the following quadratic inequalities.

(i) $x^2-4x-12\leq 0$ (ii) $x^2-7x+6>0$

(iii) $x^2+2x-15\geq 0$ (iv)

(v) $3x^2+5x+2<0$ (vi) $4x^2-4x-3>0$

(vii) $1-x-2x^2\geq 0$ (viii)

(ix) $x^2\geq 3x+10$ (x) $x(x+3)>x+8$

4. Find the set of integer values that satisfy the following inequalities:

(i) $2x^2-5x-3\leq 0$

(ii) $x^2+2x-1<0$

5. Find:

(i) 3^4 (ii) 2^6 (iii) $4^{1/2}$

(iv) 6^0 (v) 5^{-2} (vi) $64^{1/3}$

(vii) $16^{-1/2}$ (viii) $8^{5/3}$ (ix) $36^{-3/2}$

(x) $\left(\frac{1}{2}\right)^{-1}$ (xi) $\left(\frac{25}{9}\right)^{-1/2}$ (xii) $\left(\frac{27}{64}\right)^{-2/3}$

(xiii) $\frac{2^5\times 4^{1/2}}{2}$ (xiv) $\left(3^5\right)^{3/2}\times 9^{-7/4}$

6. Simplify the following expressions:

(i) $2a^3b\times 3ab\times 5b^3$ (ii) $\frac{2a^2b}{4ab^2}$

(iii) $\frac{12p^2qr^3}{9pq^2r}$ (iv) $4xy^2\div\left(2x^2y\right)^3$

(v) $a^{11}\times a^{-4}\div a^3$ (vi) $\left(p^5\right)^3\times\left(p^7\right)^{-2}$

(vii) $x^{\frac{3}{2}}\times\sqrt{x}$ (viii) $\left(y^{\frac{1}{3}}\right)^2\div y$

(ix) $\frac{p^6}{p^5\times p^3}$ (x) $\sqrt{\frac{x^{4/3}}{x^{1/3}\times x^{8/3}}}$

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7. Solve the following equations:

   (i) $x^{\frac{3}{2}} = 8$

   (ii) $y^{-2} = \frac{9}{4}$

8. Solve the inequality $(x+3)^2 > (x-1)^2$.

9. $x^a = b$

   $x^c = d$

   Express $\sqrt{\frac{b}{d}}$ as a power of x.