

1. Re-write the following decimals as fractions of integers. You do NOT have to reduce the fraction.

a) $0.\overline{721} = 0.721721721\dots$ b) $0.50\overline{71} = 0.5071717171\dots$ c) $0.64\overline{5} = 0.645555555\dots$

2. Simplify each of the following. Present your answer using only positive exponents.

a) $\left(\frac{-2a^2b^0ab^{-3}}{3ab^2a^{-1}}\right)^{-2}$ d) $a^{-3} + b^{-3}$ g) $\left(\frac{-2x^0y^5x^2}{y^{-3}x^{-4}}\right)^0$

b) $\frac{2^{-2}a^3b^{-5}}{3c^{-4}d^2}$ e) $(2a^3b^{-2}a^0)^{-2}(-2a^2b^0)^3$

c) $a^{-3}b^{-3}$ f) $\left(\frac{-2a^3b^2}{a^{-2}b^{-4}}\right)^2$

3. Simplify each of the following.

a) $\frac{2x^3 - 18x}{2x - x^2 + 15} \div \frac{6x - 8x^2 + 2x^3}{x^2 - 1}$ b) $\frac{3}{x-1} - \frac{8}{x}$

4. Factor by completing the square.

a) $x^2 - x - 30$ d) $x + 6x^2 - 1$ g) $6 - x^2 - 2x$

b) $3x^2 - x - 14$ e) $2x^2 - 12x + 20$

c) $9x^2 - 12x + 4$ f) $x^2 - 10x + 23$

5. a) Solve $5x^2 + 35 = 30x$ by completing the square.

b) Check your answers.

6. Graph the straight lines determined by $x + 2y = 8$ and $y = x - 5$. Use your graph to find the coordinates of the intersection.

7. Twice a number is eighth less than its own square. Find this number.

8. We threw an object upward from the top of a 640 ft tall building. t seconds after we dropped it, the distance of the object from the ground, (measured in feet) is

$$d = -16t^2 + 96t + 640$$

a) Find d if $t = 0$ s.

b) Find d if $t = 2$ s.

c) Find d if $t = 5$ s.

d) How long until the object hits the ground?

Answers

1. a) $\frac{721}{999}$ b) $\frac{5021}{9900}$ c) $\frac{581}{900}$

2. a) $\frac{9b^{10}}{4a^6}$ b) $\frac{a^3c^4}{12b^5d^2}$ c) $\frac{1}{a^3b^3}$ d) $\frac{1}{a^3} + \frac{1}{b^3} = \frac{a^3 + b^3}{a^3b^3}$
e) $-2b^4$ f) $4a^{10}b^{12}$ g) 1

3. a) $\frac{-x-1}{x-5} = -\frac{x+1}{x-5}$ b) $\frac{-5x+8}{x^2-x} = \frac{-5x+8}{x(x-1)}$

4. a) $(x+5)(x-6)$ b) $3(x+2)\left(x-\frac{7}{3}\right) = (x+2)(3x-7)$ c) $9\left(x-\frac{2}{3}\right)^2 = (3x-2)^2$

d) $6\left(x+\frac{1}{2}\right)\left(x-\frac{1}{3}\right) = (2x+1)(3x-1)$ e) $2(x^2-6x+10)$ f) $(x-5+\sqrt{2})(x-5-\sqrt{2})$

g) $-(x+1+\sqrt{7})(x+1-\sqrt{7})$

5. a) $x_1 = 3 - \sqrt{2}$, $x_2 = 3 + \sqrt{2}$

b) If $x = 3 + \sqrt{2}$,

$$\begin{aligned} \text{LHS} &= 5(3 + \sqrt{2})^2 + 35 = 5(9 + 2 + 6\sqrt{2}) + 35 = 5(11 + 6\sqrt{2}) + 35 = 55 + 30\sqrt{2} + 35 \\ &= 90 + 30\sqrt{2} \end{aligned}$$

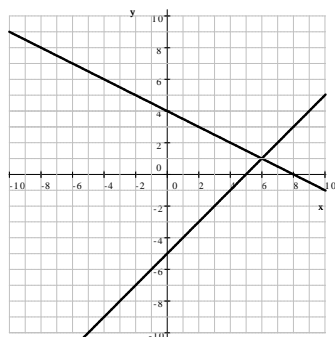
$$\text{RHS} = 30(3 + \sqrt{2}) = 90 + 30\sqrt{2}$$

If $x = 3 - \sqrt{2}$,

$$\begin{aligned} \text{LHS} &= 5(3 - \sqrt{2})^2 + 35 = 5(9 + 2 - 6\sqrt{2}) + 35 = 5(11 - 6\sqrt{2}) + 35 = 55 - 30\sqrt{2} + 35 \\ &= 90 - 30\sqrt{2} \end{aligned}$$

$$\text{RHS} = 30(3 - \sqrt{2}) = 90 - 30\sqrt{2}$$

6. (6, 1)



7. -2 and 4

8. a) 640 ft b) 768 ft c) 720 ft d) 10 seconds