Answers

1.
$$3^2 = 9 \qquad \sqrt{49} = 9 \qquad 10^3 = 1000 \qquad \sqrt[3]{64} = 4$$

$$\sqrt{72} = 6\sqrt{2}$$

$$2\sqrt{5} + 7\sqrt{5} = 9\sqrt{5}$$
$$\sqrt{75} - \sqrt{48} = 5\sqrt{3} - 4\sqrt{3} = \sqrt{3}$$
$$\sqrt{75} - \sqrt{27} = 5\sqrt{3} - 3\sqrt{3} = 2\sqrt{3}$$

$$\sqrt{12} - \sqrt{3} + \sqrt{48} = 2\sqrt{3} - \sqrt{3} + 4\sqrt{3} = 5\sqrt{3}$$

$$\begin{aligned}\sqrt{3}(\sqrt{3}-1) \\ = \sqrt{9} - \sqrt{3} \\ = 3 - \sqrt{3}\end{aligned} \qquad \begin{aligned}\sqrt{2}(3-\sqrt{6}) \\ = 3\sqrt{2} - \sqrt{12} \\ = 3\sqrt{2} - 2\sqrt{3}\end{aligned} \qquad \begin{aligned}(2+\sqrt{2})(3+\sqrt{2}) \\ = 2(3+\sqrt{2}) + \sqrt{2}(3+\sqrt{2}) \\ = 6 + 2\sqrt{2} + 3\sqrt{2} + \sqrt{4} \\ = 6 + 5\sqrt{2} + 2 = 8 + 5\sqrt{2}\end{aligned} \qquad \begin{aligned}(2\sqrt{5})(2\sqrt{5}-1) \\ = 4\sqrt{25} - 2\sqrt{5} \\ = 20 - 2\sqrt{5}\end{aligned}$$

$$x^4 \times x^5 = x^9 \qquad 3x^7 \times 5x^2 = 15x^9 \qquad x^8 \div x^5 = x^3 \qquad x^2 \div x^{-3} = x^5$$

$$(2a^3)^4 = 16a^{12} \qquad 5^0 = 1 \qquad (3ab^2)^0 = 1$$

$$\frac{x^5 \times x^4}{x^{-2}} = \frac{x^9}{x^{-2}} = x^{11} \qquad 6x^2 \times 2x^{-\frac{1}{3}} = 12x^{\frac{5}{3}}$$

2.
$$1.08 \times 10^{13} \qquad 5.5l = 5500ml \qquad 2.75 \times 10^{13}$$

$$3 + 4b - 8 = 4b - 5 \qquad 4c - c + 3 = 3c + 3 \qquad 8t + 4 + 15t - 10 = 23t + 6$$

$$6t^2 + 2t \qquad 42g - 7g^2 \qquad \begin{aligned}(x+3)(x+5) = x(x+5) + 3(x+5) \\ = x^2 + 5x + 3x + 15 \\ = x^2 + 8x + 15\end{aligned}$$

$$\begin{aligned}(4y+1)(3y-2) = 4y(3y-2) + 1(3y-2) \\ = 4y^2 - 8y + 3y - 2 \\ = 12y^2 - 5y - 2\end{aligned} \qquad \begin{aligned}(3x-4)(3x-4) = 3x(3x-4) - 4(3x-4) \\ = 9x^2 - 12x - 12x + 16 \\ = 9x^2 - 24x + 16\end{aligned}$$

3.
$$7(3 - 5x) \qquad 4a(2ab - 3c)$$

$$(x - y)(x + y) \qquad (t - 6)(t + 6) \qquad (3x - y)(3x + y) \qquad (8 - 7y)(8 + 7y)$$

$$5x^2 - 20y^2 = 5[x^2 - 4y^2] = 5(x - 2y)(x + 2y)$$

$$(x + 2)(x + 6) \qquad (x - 3)(x + 2) \qquad (x + 6)(x - 1) \qquad (x - 6)(x + 1)$$

$$(x + 3)^2 - 11 \qquad (x - 4)^2 - 12$$

4.
$$\frac{1}{3} \qquad \frac{2}{7} \qquad x^{-3} \qquad \frac{2y^3}{3} \qquad \frac{y + 2}{y - 4} \qquad \frac{x - 2}{2}$$

$$\frac{71}{15} = 4\frac{11}{15} \qquad \frac{11}{4} \times \frac{6}{5} = \frac{33}{10} = 3\frac{3}{10} \qquad \frac{7}{3} \times \frac{4}{7} = \frac{4}{3} = 1\frac{1}{3}$$

$$\frac{x}{2} - \frac{x}{3} = \frac{3x - 2x}{6} = \frac{x}{6} \qquad \frac{5}{x} + \frac{2}{y} = \frac{5y + 2x}{xy} \qquad \frac{t}{x} - \frac{3}{y} = \frac{ty - 3x}{xy}$$

$$\frac{x + 1}{2} + \frac{x - 1}{3} = \frac{3(x + 1) + 2(x - 1)}{6} = \frac{3x + 3 + 2x - 2}{6} = \frac{5x + 1}{6}$$

$$\frac{3t}{5y}$$

$$\frac{5}{3t}$$

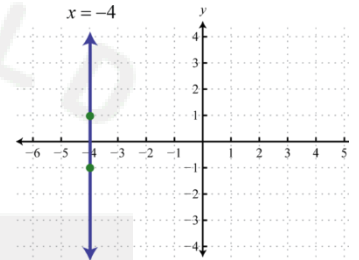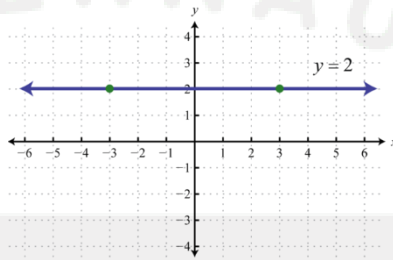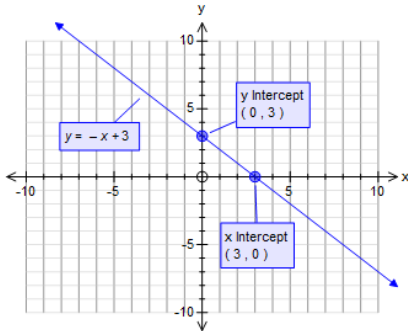$$\frac{x}{7} \div \frac{x^3}{14} = \frac{x}{7} \times \frac{14}{x^3} = \frac{14x}{7x^3} = \frac{2}{x^2}$$

Answers

5.　　2　　　　0　　　　　　Undefined

6.　　　m=2　　　　y-intercept is (0, -4)

$$x = 3 \qquad\qquad y = -5 \qquad\qquad y = 2.5x + 5$$

$$
\begin{aligned}
y - 5 &= 2(x - 1) \\
y - 5 &= 2x - 2 \\
y &= 2x + 3
\end{aligned}
\qquad
\begin{aligned}
y - 3 &= 5(x + 4) \\
y - 3 &= 5x + 20 \\
y &= 2x + 23
\end{aligned}
$$

$$m = \frac{2 - -8}{3 - -2}$$
$$= \frac{10}{5} = 2$$

$$
\begin{aligned}
y - 2 &= 2(x - 3) \\
y - 2 &= 2x - 6 \\
y &= 2x - 4
\end{aligned}
$$

7.

$$Arc = \frac{92}{360} \times \pi \times 12$$
$$= 9.6342 \ldots = 9.6cm$$

$$A = \frac{105}{360} \times \pi \times 7.5^2$$
$$= 51.541 \ldots = 50cm^2$$

$$Arc = \frac{65}{360} \times \pi \times 160$$
$$= 90.757 \ldots = 90.76m$$

$$P = 90.76 + 160$$
$$= 250.76m$$

$$A$$
$$= \frac{65}{360} \times \pi \times 80^2$$
$$= 3630.28 \ldots$$
$$= 3600m^2$$

8.　　$30^3 = 27000$　　$\frac{4}{3} \times 27000 = 27000 \div 3 = 9000 \times 4 = 36000$

$$
\begin{aligned}
36000 \times 3.14 &= 36 \times 3140 \\
&= 3140 \times 6 \\
&= 18840 \times 6 \\
&= 13040cm^3
\end{aligned}
$$

Cone: $\quad V = \frac{1}{3} \times \pi \times 5^2 \times 11 = 287.979 \ldots$ 　　　Semi-Sphere: $\quad V = \frac{4}{3} \times \pi \times 5^3 \div 2 = 261.799 \ldots$

Total Volume: $\quad = 287.979 + 261.799 = 549.77 \ldots = 550cm^3$

9.

$$
\begin{aligned}
3x &= 12 \\
x &= 4
\end{aligned}
\qquad
\begin{aligned}
8x &= 16 \\
x &= 2
\end{aligned}
\qquad
\begin{aligned}
3x &= 24 \\
x &= 8
\end{aligned}
\qquad
\begin{aligned}
3x &= 30 \\
x &= 10
\end{aligned}
$$

$$
\begin{aligned}
3x - 15 &= 21 \\
3x &= 36 \\
x &= 12
\end{aligned}
\qquad
\begin{aligned}
5x + 35 - 6x + 8 &= 45 \\
-x &= 2 \\
x &= -2
\end{aligned}
$$

$$
\begin{aligned}
5x &< 15 \\
x &< 3
\end{aligned}
\qquad
\begin{aligned}
-3x &> 6 \\
x &< -2
\end{aligned}
\qquad
\begin{aligned}
10 - 2x - 6 &> 3x - 6 \\
-5x &> -10 \\
x &< 2
\end{aligned}
$$

$x = 3 \; and \; y = 1$　　$x = 3 \; and \; y = -1$　　$x + y = 130$　　$30x + 50y = 6000$　　25 £30 seats and 105 £50 seats

10.　　AC = 11.7cm　　　　AG = 13.6cm　　　　d should be 37.5cm so not rectangular

11.   36.9° and 55.1°   11.9mm and 11.1cm