Chapter 11. Radical Expressions and Triangles

Ex. 11.1

Answer 1CU.

In case of radical expressions, if the exponent of the variable inside the radical is even and the resulting simplified exponent is odd, then absolute value is used to ensure nonnegative results. For example: $\sqrt{x^2} = |x|$.

Here,

$$\sqrt{x^4} = x^2$$

Since, the exponents of both x^4 and x^2 are even, therefore, absolute value is not necessary.

Answer 2CU.

Here

$$\frac{1}{\sqrt{a}} = \frac{1 \cdot \sqrt{a}}{\sqrt{a} \cdot \sqrt{a}} \qquad \left[\text{multiply numerator and denominator by } \sqrt{a}, a > 0\right]$$
$$= \frac{\sqrt{a}}{\left(\sqrt{a}\right)^2}$$
$$= \frac{\sqrt{a}}{a}$$

Proved.

Answer 3CU.

An example of a binomial of the form $a\sqrt{b} + c\sqrt{d}$ is $\boxed{2\sqrt{3}+3\sqrt{2}}$ and its conjugate is $\boxed{2\sqrt{3}-3\sqrt{2}}$.

Now

$$\left(2\sqrt{3}+3\sqrt{2}\right)\left(2\sqrt{3}-3\sqrt{2}\right) = \left(2\sqrt{3}\right)^2 - \left(3\sqrt{2}\right)^2$$
$$= 4 \cdot 3 - 9 \cdot 2$$
$$= 12 - 18$$
$$= -6$$

Therefore, the product of $2\sqrt{3}+3\sqrt{2}$ and $2\sqrt{3}-3\sqrt{2}$ is $\boxed{-6}$.

Answer 4CU.

Here

$$\begin{aligned}\sqrt{20} &= \sqrt{2\cdot 2\cdot 5} && [\text{prime factorization of } 20]\\ &= \sqrt{2^2\cdot 5}\\ &= 2\sqrt{5}\end{aligned}$$

The simplest form is $\boxed{2\sqrt{5}}$

Answer 5CU.

Here

$$\begin{aligned}\sqrt{2}\cdot\sqrt{8} &= \sqrt{2\cdot 8} && [\text{product property of square roots}]\\ &= \sqrt{2\cdot 2\cdot 2\cdot 2} && [\text{prime factorization of } 8]\\ &= \sqrt{2^2\cdot 2^2}\\ &= 4\end{aligned}$$

The simplest form is $\boxed{4}$

Answer 6CU.

Here

$$\begin{aligned}3\sqrt{10}\cdot 4\sqrt{10} &= 3\cdot 4\cdot\sqrt{10\cdot 10} && \left[\sqrt{ab}=\sqrt{a}\cdot\sqrt{b}\text{ for } a\ge 0 \text{ and } b\ge 0\right]\\ &= 12\sqrt{10^2}\\ &= 12\cdot 10\\ &= 120\end{aligned}$$

Therefore, the simplified form is $\boxed{120}$.

Answer 7CU.

Here

$$\begin{aligned}\sqrt{54a^2b^2} &= \sqrt{2\cdot 3\cdot 3\cdot 3\cdot a^2b^2} && [\text{prime factorization of } 54]\\ &= \sqrt{2\cdot 3\cdot 3^2\cdot a^2b^2}\\ &= 3\sqrt{6}ab\end{aligned}$$

The simplest form is $\boxed{3\sqrt{6}ab}$

Answer 8CU.

Here

$$\sqrt{60x^5y^6} = \sqrt{2\cdot 2\cdot 3\cdot 5\cdot x^2\cdot x^2\cdot x\cdot y^2\cdot y^2\cdot y^2} \qquad [\text{prime factorization of } 60]$$

$$= 2\cdot x\cdot x\cdot y\cdot y\cdot y\sqrt{3\cdot 5\cdot x}$$

$$= 2x^2y^3\sqrt{15x}$$

The simplest form is $\boxed{2x^2y^3\sqrt{15x}}$

Answer 9CU.

Here

$$\frac{4}{\sqrt{6}} = \frac{4}{\sqrt{6}}$$

$$= \frac{4\cdot\sqrt{6}}{\sqrt{6}\cdot\sqrt{6}} \qquad \left[\text{multiply by} \frac{\sqrt{6}}{\sqrt{6}}\right]$$

$$= \frac{4\sqrt{6}}{\left(\sqrt{6}\right)^2}$$

$$= \frac{\not{2}\cdot 2\sqrt{6}}{\not{2}\cdot 3}$$

$$= \frac{2\sqrt{6}}{3}$$

The simplest form is $\boxed{\dfrac{2\sqrt{6}}{3}}$

Answer 10CU.

Here

$$\sqrt{\frac{3}{10}} = \frac{\sqrt{3}}{\sqrt{10}}$$

$$= \frac{\sqrt{3}}{\sqrt{10}}\cdot\frac{\sqrt{10}}{\sqrt{10}} \qquad \left[\text{multiply by} \frac{\sqrt{10}}{\sqrt{10}}\right]$$

$$= \frac{\sqrt{3}}{\sqrt{10}}\cdot\frac{\sqrt{10}}{\sqrt{10}}$$

$$= \frac{\sqrt{30}}{\left(\sqrt{10}\right)^2} \qquad [\text{property of square roots}]$$

$$= \frac{\sqrt{30}}{10}$$

The simplest form is $\boxed{\dfrac{\sqrt{30}}{10}}$

Answer 11CU.

Here

$$\frac{8}{\left(3-\sqrt{2}\right)}=\frac{8}{\left(3-\sqrt{2}\right)}\cdot\frac{\left(3+\sqrt{2}\right)}{\left(3+\sqrt{2}\right)} \qquad \left[\text{multiply by } \frac{\left(3+\sqrt{2}\right)}{\left(3+\sqrt{2}\right)}\right]$$

$$=\frac{8\left(3+\sqrt{2}\right)}{\left(3-\sqrt{2}\right)\left(3+\sqrt{2}\right)}$$

$$=\frac{8\left(3+\sqrt{2}\right)}{3^2-\left(\sqrt{2}\right)^2} \qquad \left[\text{as } (a-b)(a+b)=a^2-b^2\right]$$

$$=\frac{24+8\sqrt{2}}{9-2}$$

$$=\frac{24+8\sqrt{2}}{7}$$

The simplest form is $\boxed{\frac{24+8\sqrt{2}}{7}}$.

Answer 12CU.

Here

$$\frac{2\sqrt{5}}{-4+\sqrt{8}}=\frac{2\sqrt{5}}{-4+\sqrt{8}}\cdot\frac{-4-\sqrt{8}}{-4-\sqrt{8}} \qquad \left[\text{multiply by } \frac{-4-\sqrt{8}}{-4-\sqrt{8}}\right]$$

$$=\frac{2\sqrt{5}\left(-4-\sqrt{8}\right)}{(-4)^2-\left(\sqrt{8}\right)^2} \qquad \left[(a+b)(a-b)=a^2-b^2\right]$$

$$=\frac{2\sqrt{5}\left(-4-\sqrt{2^2\cdot 2}\right)}{16-8}$$

$$=\frac{2\sqrt{5}\left(-4-2\sqrt{2}\right)}{8}$$

$$=\frac{\cancel{4}\sqrt{5}\left(-2-\sqrt{2}\right)}{\cancel{8}_2}$$

$$=\frac{\sqrt{5}\left(-2-\sqrt{2}\right)}{2}$$

Therefore, the simplified form is $\boxed{\frac{\sqrt{5}\left(-2-\sqrt{2}\right)}{2}}$.

Answer 14CU.

Consider the length of the pendulum,

$l = 8$.

Therefore, the period of the pendulum can be calculated as,

$$\text{Period} = 2\pi\sqrt{\frac{l}{32}}$$

$$= 2 \cdot 3.14\sqrt{\frac{8}{32}}$$

$$= 2 \cdot 3.14\sqrt{\frac{\not{8}}{\not{32}\ 4}}$$

$$= 2 \cdot 3.14\sqrt{\frac{1}{4}}$$

$$= \not{2} \cdot 3.14 \cdot \frac{1}{\not{2}}$$

$$= \boxed{3.14}$$

Answer 15PA.

Here

$$\begin{aligned}\sqrt{18} &= \sqrt{2 \cdot 3^2} \qquad [\text{prime factorization of } 18] \\ &= 3\sqrt{2}\end{aligned}$$

Therefore, the simplified form is $\boxed{3\sqrt{2}}$.

Answer 16PA.

Here

$$\begin{aligned}\sqrt{24} &= \sqrt{2 \cdot 2 \cdot 2 \cdot 3} \qquad [\text{prime factorization of } 24] \\ &= \sqrt{2^2 \cdot 2 \cdot 3} \\ &= 2\sqrt{6}\end{aligned}$$

Therefore, the simplified form is $\boxed{2\sqrt{6}}$.

Answer 17PA.

Here

$$\sqrt{80} = \sqrt{2\cdot2\cdot2\cdot2\cdot5} \qquad [\text{prime factorization of } 80]$$
$$= \sqrt{2^2\cdot2^2\cdot5}$$
$$= 4\sqrt{5}$$

Therefore, the simplified form is $\boxed{4\sqrt{5}}$.

Answer 19PA.

Here

$$\sqrt{5}\cdot\sqrt{6} = \sqrt{5\cdot6} \qquad [\text{product property of square roots}]$$
$$= \sqrt{30}$$

Therefore, the simplified form is $\boxed{\sqrt{30}}$.

Answer 20PA.

Here

$$\sqrt{3}\cdot\sqrt{8} = \sqrt{3\cdot8} \qquad [\text{product property of square roots}]$$
$$= \sqrt{3\cdot2\cdot2^2}$$
$$= 2\sqrt{6}$$

Therefore, the simplified form is $\boxed{2\sqrt{6}}$.

Answer 21PA.

Here

$$7\sqrt{30}\cdot2\sqrt{6} = 7\cdot2\sqrt{30\cdot6} \qquad [\text{product property of square roots}]$$
$$= 14\sqrt{2\cdot3\cdot5\cdot2\cdot3}$$
$$= 14\sqrt{2^2\cdot3^2\cdot5}$$
$$= 14\cdot2\cdot3\sqrt{5}$$
$$= 84\sqrt{5}$$

Therefore, the simplified form is $\boxed{84\sqrt{5}}$.

Answer 22PA.

Here

$$2\sqrt{3}\cdot 5\sqrt{27} = 2\cdot 5\sqrt{3\cdot 27} \quad \text{[product property of square roots]}$$

$$= 10\sqrt{3\cdot 3\cdot 3\cdot 3}$$

$$= 10\sqrt{3^2\cdot 3^2}$$

$$= 10\cdot 3\cdot 3$$

$$= 90$$

Therefore, the simplified form is $\boxed{90}$.

Answer 23PA.

Here

$$\sqrt{40a^4} = \sqrt{2^2\cdot 2\cdot 5\cdot \left(a^2\right)^2} \quad \text{[prime factorization of 40]}$$

$$= 2a^2\sqrt{10}$$

Therefore, the simplified form is $\boxed{2a^2\sqrt{10}}$.

Answer 25PA.

Here

$$\sqrt{147x^6y^7} = \sqrt{3\cdot 7\cdot 7\cdot \left(x^3\right)^2\cdot \left(y^3\right)^2\cdot y} \quad \text{[prime factorization of 147]}$$

$$= \sqrt{3\cdot 7^2\cdot \left(x^3\right)^2\cdot \left(y^3\right)^2\cdot y}$$

$$= 7x^3y^3\sqrt{3y}$$

Therefore, the simplified form is $\boxed{7x^3y^3\sqrt{3y}}$.

Answer 26PA.

Here

$$\sqrt{72x^3y^4z^5} = \sqrt{2^2\cdot 2\cdot 3^2\cdot x^2\cdot x\cdot \left(y^2\right)^2\cdot \left(z^2\right)^2 z} \quad \text{[prime factorization of 72]}$$

$$= \left(2\cdot 3\cdot x\cdot y^2\cdot z^2\right)\sqrt{2\cdot x\cdot z}$$

$$= 6xy^2z^2\sqrt{2xz}$$

Therefore, the simplified form is $\boxed{6xy^2z^2\sqrt{2xz}}$.

Answer 27PA.

Here

$$\sqrt{\frac{2}{7}}\cdot\sqrt{\frac{7}{3}}=\sqrt{\frac{2}{\cancel{7}}\cdot\frac{\cancel{7}}{3}} \quad \left[\sqrt{a}\cdot\sqrt{b}=\sqrt{ab}\ \textit{for}\ a\geq 0\ \textit{and}\ b\geq 0\right]$$

$$=\sqrt{\frac{2}{3}}$$

Therefore, the simplified form is $\boxed{\sqrt{\frac{2}{3}}}$.

Answer 28PA.

Here

$$\sqrt{\frac{3}{5}}\cdot\sqrt{\frac{6}{4}}=\sqrt{\frac{3}{5}\cdot\frac{6}{4}} \quad \left[\sqrt{a}\cdot\sqrt{b}=\sqrt{ab}\ \textit{for}\ a\geq 0\ \textit{and}\ b\geq 0\right]$$

$$=\sqrt{\frac{3}{5}\cdot\frac{\cancel{2}\cdot 3}{\cancel{2}\cdot 2}}$$

$$=\sqrt{\frac{3^2}{10}}$$

$$=\frac{3}{\sqrt{10}}$$

$$=\frac{3}{\sqrt{10}}\cdot\frac{\sqrt{10}}{\sqrt{10}}$$

$$=\frac{3\sqrt{10}}{10}$$

Therefore, the simplified form is $\boxed{\frac{3}{\sqrt{10}}}$.

Answer 29PA.

Here

$$\sqrt{\frac{t}{8}}=\sqrt{\frac{t}{2^2\cdot 2}}=\frac{1}{2}\sqrt{\frac{t}{2}}$$

Therefore, the simplified form is $\boxed{\frac{1}{2}\sqrt{\frac{t}{2}}}$.

Answer 30PA.

Here

$$\sqrt{\frac{27}{p^2}}=\sqrt{\frac{3^2\cdot 3}{p^2}}$$
$$=\frac{3}{p}\sqrt{3}$$

Therefore, the simplified form is $\boxed{\frac{3}{p}\sqrt{3}}$.

Answer 31PA.

Here

$$\sqrt{\frac{5c^5}{4d^5}}=\sqrt{\frac{5\left(c^2\right)^2c}{2^2\left(d^2\right)^2d}}=$$
$$=\frac{c^2}{2d^2}\sqrt{\frac{5c}{d}}$$

Therefore, the simplified form is $\boxed{\frac{c^2}{2d^2}\sqrt{\frac{5c}{d}}}$.

Answer 32PA.

Here

$$\frac{\sqrt{9x^5y}}{\sqrt{12x^2y^6}}=\frac{\sqrt{9\left(x^2\right)^2xy}}{\sqrt{4\cdot 3x^2\left(y^3\right)^2}}$$
$$=\frac{3x^2\sqrt{xy}}{2xy^3\sqrt{3}}$$
$$=\frac{3x^2\sqrt{xy}}{2xy^3\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}$$
$$=\frac{x\sqrt{3xy}}{2y^3}$$

Therefore, the simplified form is $\boxed{\frac{x}{2y^3}\sqrt{3xy}}$.

Answer 33PA.

Here

$$\frac{18}{6-\sqrt{2}}=\frac{18}{\left(6-\sqrt{2}\right)}\cdot\frac{\left(6+\sqrt{2}\right)}{\left(6+\sqrt{2}\right)} \quad \left[\text{multiply both numerator and denominator by } 6+\sqrt{2}\right]$$

$$=\frac{18\left(6+\sqrt{2}\right)}{\left(6-\sqrt{2}\right)\left(6+\sqrt{2}\right)}$$

$$=\frac{18\left(6+\sqrt{2}\right)}{6^2-\left(\sqrt{2}\right)^2}$$

$$=\frac{18\left(6+\sqrt{2}\right)}{36-2}$$

$$=\frac{\cancel{2}\cdot 9\left(6+\sqrt{2}\right)}{17\cdot\cancel{2}}$$

$$=\frac{9\left(6+\sqrt{2}\right)}{17}$$

Therefore, the simplified form is $\boxed{\frac{9\left(6+\sqrt{2}\right)}{17}}$.

Answer 34PA.

Here

$$\frac{2\sqrt{5}}{-4+\sqrt{8}}=\frac{2\sqrt{5}}{\left(-4+\sqrt{8}\right)}\cdot\frac{\left(-4-\sqrt{8}\right)}{\left(-4-\sqrt{8}\right)} \quad \left[\text{multiply by}\frac{\left(-4-\sqrt{8}\right)}{\left(-4-\sqrt{8}\right)}\right]$$

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

$$=\frac{2\sqrt{5}\left(-4-\sqrt{2^2\cdot 2}\right)}{(-4)^2-\left(\sqrt{8}\right)^2}$$

$$=\frac{2\sqrt{5}\left(-4-2\sqrt{2}\right)}{16-8}$$

$$=\frac{\cancel{4}\sqrt{5}\left(-2-\sqrt{2}\right)}{2\cdot\cancel{4}}$$

$$=\frac{\sqrt{5}\left(-2-\sqrt{2}\right)}{2}$$

Therefore, the simplified form is $\boxed{\frac{\sqrt{5}\left(-2-\sqrt{2}\right)}{2}}$.

Answer 35PA.

Here

$$\frac{10}{\sqrt{7}+\sqrt{2}} = \frac{10}{\left(\sqrt{7}+\sqrt{2}\right)} \cdot \frac{\sqrt{7}-\sqrt{2}}{\sqrt{7}-\sqrt{2}} \qquad \left[\text{multiply by} \frac{\sqrt{7}-\sqrt{2}}{\sqrt{7}-\sqrt{2}}\right]$$

$$= \frac{10\left(\sqrt{7}-\sqrt{2}\right)}{\left(\sqrt{7}+\sqrt{2}\right)\left(\sqrt{7}-\sqrt{2}\right)}$$

$$= \frac{10\left(\sqrt{7}-\sqrt{2}\right)}{\left(\sqrt{7}\right)^2-\left(\sqrt{2}\right)^2}$$

$$= \frac{10\left(\sqrt{7}-\sqrt{2}\right)}{7-2}$$

$$= \frac{2\cdot \cancel{5}\left(\sqrt{7}-\sqrt{2}\right)}{\cancel{5}}$$

$$= 2\left(\sqrt{7}-\sqrt{2}\right)$$

Therefore, the simplified form is $\boxed{2\left(\sqrt{7}-\sqrt{2}\right)}$.

Answer 36PA.

Here

$$\frac{2}{\sqrt{3}+\sqrt{6}} = \frac{2}{\sqrt{3}+\sqrt{6}} \cdot \frac{\sqrt{3}-\sqrt{6}}{\sqrt{3}-\sqrt{6}} \quad \left[\text{multiply by } \frac{\sqrt{3}-\sqrt{6}}{\sqrt{3}-\sqrt{6}}\right]$$

$$= \frac{2\left(\sqrt{3}-\sqrt{6}\right)}{\left(\sqrt{3}+\sqrt{6}\right)\left(\sqrt{3}-\sqrt{6}\right)}$$

$$= \frac{2\left(\sqrt{3}-\sqrt{6}\right)}{\left(\sqrt{3}\right)^2-\left(\sqrt{6}\right)^2}$$

$$= \frac{2\left(\sqrt{3}-\sqrt{6}\right)}{3-6}$$

$$= \frac{2\left(\sqrt{3}-\sqrt{6}\right)}{-3}$$

$$= \frac{2}{3}\left(\sqrt{6}-\sqrt{3}\right)$$

Therefore, the simplified form is $\boxed{\frac{2}{3}\left(\sqrt{6}-\sqrt{3}\right)}$.

Answer 37PA.

Here

$$\frac{4}{4-3\sqrt{3}}=\frac{4}{\left(4-3\sqrt{3}\right)}\cdot\frac{\left(4+3\sqrt{3}\right)}{\left(4+3\sqrt{3}\right)} \qquad \left[\text{multiply by}\frac{\left(4+3\sqrt{3}\right)}{\left(4+3\sqrt{3}\right)}\right]$$

$$=\frac{4\left(4+3\sqrt{3}\right)}{\left(4-3\sqrt{3}\right)\left(4+3\sqrt{3}\right)}$$

$$=\frac{4\left(4+3\sqrt{3}\right)}{4^2-\left(3\sqrt{3}\right)^2}$$

$$=\frac{4\left(4+3\sqrt{3}\right)}{16-27}$$

$$=\frac{4\left(4+3\sqrt{3}\right)}{-11}$$

$$=-\frac{4}{11}\left(4+3\sqrt{3}\right)$$

Therefore, the simplified form is $\boxed{-\frac{4}{11}\left(4+3\sqrt{3}\right)}$.

Answer 38PA.

Here

$$\frac{3\sqrt{7}}{5\sqrt{3}+3\sqrt{5}}=\frac{3\sqrt{7}}{\left(5\sqrt{3}+3\sqrt{5}\right)}\cdot\frac{\left(5\sqrt{3}-3\sqrt{5}\right)}{\left(5\sqrt{3}-3\sqrt{5}\right)} \qquad \left[\text{multiply by}\frac{\left(5\sqrt{3}-3\sqrt{5}\right)}{\left(5\sqrt{3}-3\sqrt{5}\right)}\right]$$

$$=\frac{3\sqrt{7}\left(5\sqrt{3}-3\sqrt{5}\right)}{\left(5\sqrt{3}+3\sqrt{5}\right)\left(5\sqrt{3}-3\sqrt{5}\right)}$$

$$=\frac{3\sqrt{7}\left(5\sqrt{3}-3\sqrt{5}\right)}{\left(5\sqrt{3}\right)^2-\left(3\sqrt{5}\right)^2}$$

$$=\frac{3\sqrt{7}\left(5\sqrt{3}-3\sqrt{5}\right)}{75-45}$$

$$=\frac{3\sqrt{7}\left(5\sqrt{3}-3\sqrt{5}\right)}{30}$$

$$=\frac{\cancel{3}\sqrt{7}\left(5\sqrt{3}-3\sqrt{5}\right)}{\cancel{3}\cdot 10}$$

$$=\frac{\sqrt{7}\left(5\sqrt{3}-3\sqrt{5}\right)}{10}$$

Therefore, the simplified form is $\boxed{\frac{\sqrt{7}}{10}\left(5\sqrt{3}-3\sqrt{5}\right)}$.

Answer 39PA.

The area A of a rectangle with width b and length l is given by $A = b \cdot l$.

Here, $b = 3\sqrt{5}, l = 4\sqrt{10}$. Therefore,

$$\begin{aligned} A &= b \cdot l \\ &= \left(3\sqrt{5}\right) \cdot \left(4\sqrt{10}\right) \\ &= 3 \cdot 4\sqrt{5 \cdot 10} \\ &= 12\sqrt{5 \cdot 5 \cdot 2} \\ &= 12\sqrt{5^2 \cdot 2} \\ &= 12 \cdot 5\sqrt{2} \\ &= 60\sqrt{2} \end{aligned}$$

Hence, the area of the rectangle is $\boxed{60\sqrt{2}\ \text{centimeter}^2}$

Answer 40PA.

The area A of a rectangle with width b and length l is given by $A = b \cdot l$.

Here, $b = \sqrt{\frac{a}{2}}, l = \sqrt{\frac{a}{8}}$. Therefore,

$$\begin{aligned} A &= b \cdot l \\ &= \sqrt{\frac{a}{2}} \cdot \sqrt{\frac{a}{8}} \\ &= \sqrt{\frac{a}{2} \cdot \frac{a}{8}} \\ &= \sqrt{\frac{a^2}{4^2}} \\ &= \frac{a}{4} \end{aligned}$$

Hence, the area of the rectangle is $\boxed{\frac{a}{4}\ \text{meter}^2}$

Answer 41PA.

The area A of a square with side s is $A = s^2$.

Now,

$$\begin{aligned} A &= s^2 \\ s^2 &= A \\ s &= \sqrt{A} \qquad [\text{as area is positive}] \end{aligned}$$

For $A = 72$ square inches,

$$\begin{aligned} s &= \sqrt{A} \\ &= \sqrt{72} \\ &= \sqrt{6^2 \cdot 2} \\ &= 6\sqrt{2} \end{aligned}$$

Hence, the side length of the square is $\boxed{6\sqrt{2}\ \text{inches}}$.

Answer 42PA.

If E is the kinetic energy in joules, m is the mass in kilograms, and v is the velocity in meters per second, then the formula for the kinetic energy of a moving object is:

$$E = \frac{1}{2}mv^2$$

Now

$$E = \frac{1}{2}mv^2$$

$$2E = mv^2$$

$$v = \boxed{\sqrt{\frac{2E}{m}}}$$

Answer 43PA.

If E is the kinetic energy in joules, m is the mass in kilograms, and v is the velocity in meters per second, then the formula for the kinetic energy of a moving object is:

$$E = \frac{1}{2}mv^2$$

Now

$$E = \frac{1}{2}mv^2$$

$$2E = mv^2$$

$$v = \sqrt{\frac{2E}{m}}$$

Here $m = 0.6 \text{ kilogram}$ $E = 54 \text{ joules}$ and hence

$$v = \sqrt{\frac{2E}{m}}$$

$$= \sqrt{\frac{2 \cdot 54}{0.6}}$$

$$= \sqrt{180}$$

$$= \sqrt{6^2 \cdot 5}$$

$$= 6\sqrt{5}$$

Therefore, velocity is $\boxed{6\sqrt{5} \text{ meters per second}}$.

Answer 44PA.

The escape velocity of an object is given by $v_e = \sqrt{\frac{2GM}{R}}$, where *G* is universal gravitational constant, *M* is the mass and *R* is the radius of the object. Here,

$$G = \frac{6.7\times10^{-20}\text{ km}}{s^2\text{ kg}}$$
$$M = 7.4\times10^{22}\text{ kg}$$
$$R = 1.7\times10^{3}\text{ km}$$

Now,

$$\begin{aligned}
v_e &= \sqrt{\frac{2\times6.7\times10^{-20}\times7.4\times10^{22}}{1.7\times10^{3}}}\frac{\text{km}}{\text{s}} \\
&= \sqrt{\frac{2\times6.7\times7.4\times10^{-20+22-3}}{1.7}} \\
&= \sqrt{\frac{2\times6.7\times7.4\times10^{-3}}{1.7}} \\
&= 2.4
\end{aligned}$$

Therefore, the escape velocity is $\boxed{2.4\frac{\text{km}}{\text{s}}}$.

The escape velocity for earth is $11.2\frac{\text{km}}{\text{s}}$ and the escape velocity for moon is $2.4\frac{\text{km}}{\text{s}}$.
Comparing these velocities, the escape velocity for earth is greater than that for moon.

Answer 45PA.

The speed of a car is given by $s = \sqrt{30fd}$, where f is the coefficient of friction for the type and condition of the road and the distance d in feet of its skid marks.

Here, $f = 0.6$, therefore

$$\begin{aligned}
s &= \sqrt{30\cdot0.6d} \\
&= \sqrt{18d} \\
&= \sqrt{3^2\cdot2d} \\
&= 3\sqrt{2d}
\end{aligned}$$

Thus, the expression for the speed is $\boxed{s = 3\sqrt{2d}}$.

Answer 46PA.

The speed of a car is given by $s=\sqrt{30fd}$, where f is the coefficient of friction for the type and condition of the road and the distance d in feet of its skid marks.

Here, $f=0.8$, therefore

$$\begin{aligned}s&=\sqrt{30\cdot 0.8d}\\&=\sqrt{24d}\\&=\sqrt{2^2\cdot 6d}\\&=2\sqrt{6d}\end{aligned}$$

Thus, the expression for the speed is $\boxed{s=2\sqrt{6d}}$.

Answer 47PA.

The speed of a car is given by $s=\sqrt{30fd}$, where f is the coefficient of friction for the type and condition of the road and the distance d in feet of its skid marks.

Here, $d=110\text{ feet}$.

For wet road condition, $f=0.6$, therefore

$$\begin{aligned}s&=\sqrt{30\cdot 0.6d}\\&=\sqrt{18d}\\&=\sqrt{3^2\cdot 2d}\\&=3\sqrt{2\cdot 110}\\&=3\sqrt{2\cdot 2\cdot 55}\\&=3\sqrt{2^2\cdot 55}\\&=6\sqrt{55}\\&\approx 44.5\end{aligned}$$

Thus, the speed for wet road condition is $\boxed{44.5\text{ mph}}$.

For dry road condition, $f=0.8$, therefore

$$\begin{aligned}s&=\sqrt{30\cdot 0.8d}\\&=\sqrt{24d}\\&=\sqrt{2^2\cdot 6\cdot 110}\\&=2\sqrt{2\cdot 3\cdot 2\cdot 55}\\&=2\sqrt{2^2\cdot 165}\\&=4\sqrt{165}\\&\approx 51.4\end{aligned}$$

Thus, the speed for dry road condition is $\boxed{51.4\text{ mph}}$.

Answer 48PA.

The Hero's formula to calculate the area A of a triangle with side lengths a,b and c is

$A=\sqrt{s(s-a)(s-b)(s-c)}$ where $s=\frac{1}{2}(a+b+c)$

For $a=13$, $b=10$ and $c=7$, we have

$$\begin{aligned} s &= \frac{1}{2}(13+10+7) \\ &= \frac{1}{2}\cdot 30 \\ &= \boxed{15} \end{aligned}$$

Therefore, the value of s is $\boxed{15 \text{ feet}}$.

Answer 49PA.

The Hero's formula to calculate the area A of a triangle with side lengths a,b and c is

$A=\sqrt{s(s-a)(s-b)(s-c)}$ where $s=\frac{1}{2}(a+b+c)$

For $a=13$, $b=10$ and $c=7$, we have

$$\begin{aligned} s &= \frac{1}{2}(13+10+7) \\ &= \frac{1}{2}\cdot 30 \\ &= 15 \end{aligned}$$

Now,

$$\begin{aligned} A &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{15(15-13)(15-10)(15-7)} \\ &= \sqrt{15\cdot 2\cdot 5\cdot 8} \\ &= \sqrt{3\cdot 4^2\cdot 5^2} \\ &= 4\cdot 5\sqrt{3} \\ &= 20\sqrt{3} \end{aligned}$$

Therefore, the area is $\boxed{20\sqrt{3}\text{ feet}^2}$.

Answer 50PA.

Here

$$\begin{aligned} \frac{1}{a-1+\sqrt{a}} &= \frac{1}{a-1+\sqrt{a}}\cdot\frac{(a-1-\sqrt{a})}{(a-1-\sqrt{a})} \qquad \left[\text{multiply by } \frac{(a-1-\sqrt{a})}{(a-1-\sqrt{a})}\right] \\ &= \frac{a-1-\sqrt{a}}{(a-1)^2-(\sqrt{a})^2} \\ &= \frac{a-1-\sqrt{a}}{a^2-2a+1-a} \\ &= \frac{a-1-\sqrt{a}}{a^2-3a+1} \end{aligned}$$

Therefore, the simplified form is $\boxed{\dfrac{a-1-\sqrt{a}}{a^2-3a+1}}$.

Answer 51PA.

Various formulas and calculations are used in space exploration that contains radical expressions.

The escape velocity of an object is given by $v_e = \sqrt{\frac{2GM}{R}}$, where *G* is universal gravitational constant, *M* is the mass and *R* is the radius of the object. That is, to determine the escape velocity of a planet, you would need to know its radius and mass. It is very important to know the escape velocity of a planet before you landed on it so you would know if you had enough fuel and velocity to launch from it to get back into space.

Compare the escape velocities of two astronomical bodies with same mass, but different radii as shown below:

Suppose $v_e^{\,1}$ and R_1 is the escape velocity and radius of first astronomical body, and $v_e^{\,2}$ and R_2 is the escape velocity and radius of second astronomical body. Therefore,

$$v_e^{\,1} = \sqrt{\frac{GM}{R_1}} \quad v_e^{\,2} = \sqrt{\frac{GM}{R_2}}$$

Now

$$\begin{aligned}\frac{v_e^{\,1}}{v_e^{\,2}} &= \sqrt{\frac{GM}{R_1} \cdot \frac{R_2}{GM}} \\ &= \sqrt{\frac{R_2}{R_1}}\end{aligned}$$

Clearly, the astronomical body with the smaller radius would have a greater escape velocity. As the radius decreases, the escape velocity increases.

Answer 52PA.

The surface area of a cube with side length s is given by $6s^2$. If the surface area is $96a^2$, then

$$\begin{aligned}6s^2 &= 96a^2 \\ s^2 &= \frac{96}{6}a^2 \\ s^2 &= 16a^2 \\ s &= 4a\end{aligned}$$

Now, the volume V of the cube is:

$$\begin{aligned}V &= s^3 \\ &= (4a)^3 \\ &= \boxed{64a^3}\end{aligned}$$

Answer 53PA.

Here

$$\begin{aligned} x &= 81b^2 \\ \sqrt{x} &= \sqrt{81b^2} \\ &= \sqrt{(9b)^2} \\ &= \boxed{9b} \end{aligned}$$

Answer 54PA.

The formula for finding the windchill factor is

$$y = 91.4 - (91.4 - t)\left[0.478 + 0.301\left(\sqrt{x} - 0.02\right)\right]$$

Here, y represents the windchill factor, t represents the air temperature in degrees Fahrenheit, and x represents the wind speed in miles per hour.

Here, $t = 12^\circ$ and $y = -9^\circ$. Therefore, using graphing calculator:

Thus, the wind speed is approximately $\boxed{6.93 \text{ miles per hour}}$.

Answer 55PA.

The formula for finding the windchill factor is

$$y = 91.4 - (91.4 - t)\left[0.478 + 0.301\left(\sqrt{x} - 0.02\right)\right]$$

Here, y represents the windchill factor, t represents the air temperature in degrees Fahrenheit, and x represents the wind speed in miles per hour.

Here, $t = 12^\circ$ and $x = 4 \text{ miles per hour}$. Therefore, using graphing calculator:

$$\begin{aligned} y &= 91.4 - (91.4 - 12)\left[0.478 + 0.301\left(\sqrt{4} - 0.02\right)\right] \\ &\approx 6.126 \end{aligned}$$

Thus, it feels like $\boxed{6.126^\circ}$ with the windchill factor.

Answer 56PA.

Here

$$\begin{aligned} x^{\frac{1}{2}} \cdot x^{\frac{1}{2}} &= \sqrt{x} \cdot \sqrt{x} \\ &= \left(\sqrt{x}\right)^2 \\ &= x \end{aligned}$$

Therefore, the simplified form is $\boxed{x}$.

Answer 57PA.

Here

$$\left(x^{\frac{1}{2}}\right)^4 = \left(\sqrt{x}\right)^4$$
$$= \left(\left(\sqrt{x}\right)^2\right)^2$$
$$= x^2$$

Therefore, the simplified form is $\boxed{x^2}$.

Answer 58PA.

Here

$$\frac{x^{\frac{5}{2}}}{x} = \frac{\left(\sqrt{x}\right)^5}{x}$$
$$= \frac{x^2\sqrt{x}}{x}$$
$$= x\sqrt{x}$$

Therefore, the simplified form is $\boxed{x\sqrt{x}}$.

Answer 59PA.

Here

$$\frac{\sqrt{a}}{a\sqrt[3]{a}} = \frac{a^{\frac{1}{2}}}{aa^{\frac{1}{3}}}$$
$$= \frac{a^{\frac{1}{2}}}{a^{\frac{4}{3}}}$$
$$= \frac{1}{a^{\frac{4}{3}-\frac{1}{2}}}$$
$$= \frac{1}{a^{\frac{8-3}{6}}}$$
$$= \frac{1}{a^{\frac{5}{6}}}$$
$$= \frac{1}{\sqrt[6]{a^5}}$$

Therefore, the simplified form is $\boxed{\frac{1}{\sqrt[6]{a^5}}}$.

Answer 60PA.

Here

$$|y^3| = \frac{1}{3\sqrt{3}}$$

$$y^3 = \pm\left(\frac{1}{3\sqrt{3}}\right)$$

$$= \pm\left(\frac{1}{33^{\frac{1}{2}}}\right)^{\frac{1}{3}}$$

$$= \pm\left(\frac{1}{3^{\frac{3}{2}}}\right)^{\frac{1}{3}}$$

$$= \pm\frac{1}{3^{\frac{3}{2}\cdot\frac{1}{3}}}$$

$$= \pm\frac{1}{\sqrt{3}}$$

Therefore, the solutions are $\boxed{\pm\frac{1}{\sqrt{3}}}$.

Answer 61PA.

Here

$$\left(s^2 t^{\frac{1}{2}}\right)^8 \sqrt{s^5 t^4} = s^{16} t^4 \sqrt{s^5 t^4}$$

$$= s^{16} t^4\, t^2 s^{\frac{5}{2}}$$

$$= s^{16+\frac{5}{2}}\, t^6$$

$$= s^{\frac{37}{2}}\, t^6$$

$$= \sqrt{s^{37} t^{12}}$$

$$= \sqrt{\left(s^{18}\right)^2 s \left(t^6\right)^2}$$

$$= s^{18} t^6 \sqrt{s}$$

Therefore, the simplified form is $\boxed{s^{18} t^6 \sqrt{s}}$.

Answer 62MYS.

A geometric sequence with first term a and common difference r is given by

$a, ar, ar^2, \cdots$

Here, the geometric sequence is $2, 6, 18, 54$. Now,

$$\begin{aligned} r &= \frac{ar}{a} \\ &= \frac{6}{2} \\ &= 3 \end{aligned}$$

Therefore, the next three terms are:

$$\begin{aligned} 54 \cdot 3 &= \boxed{162} \\ 162 \cdot 3 &= \boxed{486} \\ 486 \cdot 3 &= \boxed{1458} \end{aligned}$$

And the geometric sequence $2, 6, 18, 54, \boxed{162}, \boxed{486}, \boxed{1458}$

Answer 63MYS.

A geometric sequence with first term a and common difference r is given by

$a, ar, ar^2, \cdots$

Here, the geometric sequence is $1, -2, 4, -8$. Now,

$$\begin{aligned} r &= \frac{ar}{a} \\ &= \frac{-2}{1} \\ &= -2 \end{aligned}$$

Therefore, the next three terms are:

$$\begin{aligned} (-8) \cdot (-2) &= \boxed{16} \\ 16 \cdot (-2) &= \boxed{-32} \\ (-32) \cdot (-2) &= \boxed{64} \end{aligned}$$

And the geometric sequence $1, -2, 4, -8, \boxed{16}, \boxed{-32}, \boxed{64}$

Answer 64MYS.

A geometric sequence with first term a and common difference r is given by

$a, ar, ar^2, \cdots$

Here, the geometric sequence is $384, 192, 96, 48$. Now,

$$\begin{aligned} r &= \frac{ar}{a} \\ &= \frac{192}{384} \\ &= \frac{1}{2} \end{aligned}$$

Therefore, the next three terms are:

$$48 \cdot \frac{1}{2} = \boxed{24}$$

$$24 \cdot \frac{1}{2} = \boxed{12}$$

$$12 \cdot \frac{1}{2} = \boxed{6}$$

And the geometric sequence $384, 192, 96, 48, \boxed{24}, \boxed{12}, \boxed{6}$

Answer 65MYS.

A geometric sequence with first term a and common difference r is given by

$a, ar, ar^2, \cdots$

Here, the geometric sequence is $\frac{1}{9}, \frac{2}{3}, 4, 24$. Now,

$$\begin{aligned} r &= \frac{ar}{a} \\ &= \frac{\frac{2}{3}}{\frac{1}{9}} \\ &= \frac{2}{3} \cdot 9 \\ &= 6 \end{aligned}$$

Therefore, the next three terms are:

$$24 \cdot 6 = \boxed{144}$$

$$144 \cdot 6 = \boxed{864}$$

$$864 \cdot 6 = \boxed{5184}$$

And the geometric sequence $\frac{1}{9}, \frac{2}{3}, 4, 24, \boxed{144}, \boxed{864}, \boxed{5184}$

Answer 66MYS.

A geometric sequence with first term a and common difference r is given by

$a, ar, ar^2, \cdots$

Here, the geometric sequence is $3, \frac{3}{4}, \frac{3}{16}, \frac{3}{64}$. Now,

$$r = \frac{ar}{a} = \frac{\frac{3}{4}}{3} = \frac{1}{4}$$

Therefore, the next three terms are:

$$\frac{3}{64} \cdot \frac{1}{4} = \boxed{\frac{3}{256}}$$

$$\frac{3}{256} \cdot \frac{1}{4} = \boxed{\frac{3}{1024}}$$

$$\frac{3}{1024} \cdot \frac{1}{4} = \boxed{\frac{3}{4096}}$$

And the geometric sequence $3, \frac{3}{4}, \frac{3}{16}, \frac{3}{64}, \boxed{\frac{3}{256}}, \boxed{\frac{3}{1024}}, \boxed{\frac{3}{4096}}$

Answer 67MYS.

A geometric sequence with first term a and common difference r is given by

$a, ar, ar^2, \cdots$

Here, the geometric sequence is $50, 10, 2, 0.4$. Now,

$$r = \frac{ar}{a} = \frac{10}{50} = \frac{1}{5}$$

Therefore, the next three terms are:

$$0.4 \cdot \frac{1}{5} = \boxed{0.08}$$

$$0.08 \cdot \frac{1}{5} = \boxed{0.016}$$

$$0.016 \cdot \frac{1}{5} = \boxed{0.0032}$$

And the geometric sequence $50, 10, 2, 0.4, \boxed{0.08}, \boxed{0.016}, \boxed{0.0032}$

Answer 68MYS.

The initial number of bacteria is 1000. After 2 hours, it will be 2000 and so on.

The growth sequence of the bacteria is $1000, 2000, 4000, \cdots$. This is a geometric sequence.

Here, the first term $a = 1000$ and common ratio is $r = \frac{2000}{1000} = 2$. Therefore, the number of bacteria after 24 hours is:

$$\begin{aligned} ar^{\frac{24}{2}} &= 1000 \cdot 2^{12} \\ &= 1000 \cdot 4096 \\ &= \boxed{4096000} \end{aligned}$$

Answer 69MYS.

The modeled equation of cooling of the coffee is $y = 75(0.875)^t$.

For $t = 15$, we have:

$$\begin{aligned} y &= 75(0.875)^t \\ &= 75(0.875)^{15} \\ &\approx 75(0.1349) \\ &\approx 10.1 \end{aligned}$$

Therefore, the temperature of the coffee after 15 minutes is $95 - (10.1) = \boxed{84.9^\circ\text{C}}$.

Answer 70MYS.

The trinomial is $6x^2 + 7x - 5$

Now,

$$\begin{aligned} 6x^2 + 7x - 5 &= 6x^2 + 10x - 3x - 5 \\ &= 2x(3x+5) - 1(3x+5) \\ &= (3x+5)(2x-1) \end{aligned}$$

The factored trinomial is $\boxed{(3x+5)(2x-1)}$.

Answer 71MYS.

The trinomial is $35x^2 - 43x + 12$

Now,

$$\begin{aligned} 35x^2 - 43x + 12 &= 35x^2 - 28x - 15x + 12 \\ &= 7x(5x-4) - 3(5x-4) \\ &= (5x-4)(7x-3) \end{aligned}$$

The factored trinomial is $\boxed{(5x-4)(7x-3)}$.

Answer 72MYS.

The trinomial is $5x^2+3x+31$

This trinomial cannot be written as the form of $(x+a)(x+b)$. Therefore, the trinomial is $\boxed{\text{prime}}$

Answer 73MYS.

The trinomial is $3x^2-6x-105$

Now,

$$\begin{aligned}3x^2-6x-105&=3\left(x^2-2x-35\right)\\&=3\left(x^2-7x+5x-35\right)\\&=3\left(x(x-7)+5(x-7)\right)\\&=3(x+5)(x-7)\end{aligned}$$

The factored trinomial is $\boxed{3(x+5)(x-7)}$.

Answer 74MYS.

The trinomial is $4x^2-12x+15$

This trinomial cannot be written as the form of $(x+a)(x+b)$. Therefore, the trinomial is $\boxed{\text{prime}}$

Answer 75MYS.

The trinomial is $8x^2-10x+3$

Now,

$$\begin{aligned}8x^2-10x+3&=8x^2-6x-4x+3\\&=2x(4x-3)-1(4x-3)\\&=(4x-3)(2x-1)\end{aligned}$$

The factored trinomial is $\boxed{(4x-3)(2x-1)}$.

Answer 76MYS.

The equation is $y = 3x + 2$ and the replacement set is $\{(1,5),(2,6),(-2,2),(-4,-10)\}$.

For $(1,5)$

$$y = 3x + 2$$
$$5 = 3\cdot 1 + 2$$
$$5 = 3 + 2$$
$$5 = 5$$

This is true.

For $(2,6)$

$$y = 3\cdot 2 + 2$$
$$6 = 6 + 2$$
$$6 = 8$$

This is not true.

For $(-2,2)$

$$y = 3\cdot(-2) + 2$$
$$2 = -6 + 2$$
$$2 = 4$$

This is not true.

For $(-4,-10)$

$$y = 3\cdot(-4) + (-10)$$
$$-10 = -12 - 10$$
$$-10 = -22$$

This is not true.

Therefore, the solution set is $\boxed{\{(1,5)\}}$.

Answer 77MYS.

The equation is $5x+2y=10$ and the replacement set is $\{(3,5),(2,0),(4,2),(1,2.5)\}$.

For $(3,5)$

$$\begin{aligned} 5x+2y&=10 \\ 5\cdot 3+2\cdot 5&=10 \\ 15+10&=10 \\ 25&=10 \end{aligned}$$

This is not true.

For $(2,0)$

$$\begin{aligned} 5x+2y&=10 \\ 5\cdot 2+2\cdot 0&=10 \\ 10+0&=10 \\ 10&=10 \end{aligned}$$

This is true.

For $(4,2)$

$$\begin{aligned} 5x+2y&=10 \\ 5\cdot 4+2\cdot 2&=10 \\ 20+4&=10 \\ 24&=10 \end{aligned}$$

This is not true.

For $(1,2.5)$

$$\begin{aligned} 5x+2y&=10 \\ 5\cdot 1+2\cdot(2.5)&=10 \\ 5+5&=10 \\ 10&=10 \end{aligned}$$

This is true.

Therefore, the solution set is $\boxed{\{(2,0),(1,2.5)\}}$.

Answer 78MYS.

The equation is $3a+2b=11$ and the replacement set is $\{(-3,10),(4,1),(2,2.5),(3,-2)\}$.

For $(-3,10)$

$$\begin{aligned} 3a+2b&=11 \\ 3\cdot(-3)+2\cdot 10&=11 \\ -9+20&=11 \\ 11&=11 \end{aligned}$$

This is true.

For $(4,1)$

$$\begin{aligned} 3a+2b&=11 \\ 3\cdot 4+2\cdot 1&=11 \\ 12+2&=11 \\ 14&=11 \end{aligned}$$

This is not true.

For $(2,2.5)$

$$\begin{aligned} 3a+2b&=11 \\ 3\cdot 2+2\cdot 2.5&=11 \\ 6+5&=11 \\ 11&=11 \end{aligned}$$

This is true.

For $(3,-2)$

$$\begin{aligned} 3a+2b&=11 \\ 3\cdot 3+2\cdot(-2)&=11 \\ 9-4&=11 \\ 5&=11 \end{aligned}$$

This is not true.

Therefore, the solution set is $\boxed{\{(-3,10),(2,2.5)\}}$.

Answer 79MYS.

The equation is $5-\frac{3}{2}x=2y$ and the replacement set is $\left\{(0,1),(8,2),\left(4,-\frac{1}{2}\right),(2,1)\right\}$.

For $(0,1)$

$$5-\frac{3}{2}x=2y$$
$$5-\frac{3}{2}\cdot 0=2\cdot 1$$
$$5-0=2$$
$$5=2$$

This is not true.

For $(8,2)$

$$5-\frac{3}{2}x=2y$$
$$5-\frac{3}{2}\cdot 8=2\cdot 2$$
$$5-12=4$$
$$-7=4$$

This is not true.

For $\left(4,-\frac{1}{2}\right)$

$$5-\frac{3}{2}x=2y$$
$$5-\frac{3}{2}\cdot 4=2\cdot\left(-\frac{1}{2}\right)$$
$$5-6=-1$$
$$-1=-1$$

This is true.

For $(2,1)$

$$5-\frac{3}{2}x=2y$$
$$5-\frac{3}{2}\cdot 2=2\cdot 1$$
$$5-3=2$$
$$2=2$$

This is true.

Therefore, the solution set is $\boxed{\left\{\left(4,-\frac{1}{2}\right),(2,1)\right\}}$.

Answer 80MYS.

The equation is $40 = -5d$

Now

$$\begin{aligned} 40 &= -5d \\ -5d &= 40 \\ d &= \frac{40}{-5} \\ &= -8 \end{aligned}$$

Check:

$$\begin{aligned} 40 &= -5d \\ 40 &= (-5)\cdot(-8) \\ 40 &= 40 \end{aligned}$$

This is true.

Therefore, the solution is $\boxed{-8}$.

Answer 81MYS.

The equation is $20.4 = 3.4y$

Now

$$\begin{aligned} 20.4 &= 3.4y \\ 3.4y &= 20.4 \\ y &= \frac{20.4}{3.4} \\ &= 6 \end{aligned}$$

Check:

$$\begin{aligned} 20.4 &= 3.4y \\ 20.4 &= 3.4\cdot 6 \\ 20.4 &= 20.4 \end{aligned}$$

This is true.

Therefore, the solution is $\boxed{6}$.

Answer 82MYS.

The equation is $\frac{h}{-11} = -25$

Now

$$\frac{h}{-11} = -25$$
$$h = (-11)(-25)$$
$$= 11 \cdot 25$$
$$= 275$$

Check:

$$\frac{h}{-11} = -25$$
$$\frac{275}{-11} = -25$$
$$-25 = -25$$

This is true.

Therefore, the solution is $\boxed{275}$.

Answer 83MYS.

The equation is $-65 = \frac{r}{29}$

Now

$$-65 = \frac{r}{29}$$
$$\frac{r}{29} = -65$$
$$r = (-65) \cdot 29$$
$$= -1885$$

Check:

$$-65 = \frac{r}{29}$$
$$-65 = \frac{-1885}{29}$$
$$-65 = -65$$

This is true.

Therefore, the solution is $\boxed{-65}$.

Answer 84MYS.

Here

$$\begin{aligned}(x-3)(x+2) &= x(x+2)-3(x+2)\\ &= x^2+x\cdot 2-3\cdot x-3\cdot 2\\ &= x^2+2x-3x-6\\ &= x^2-3x-6\end{aligned}$$

Therefore, the product is $\boxed{x^2-3x-6}$.

Answer 85MYS.

Here

$$\begin{aligned}(a+2)(a+5) &= a(a+5)+2(a+5)\\ &= a^2+a\cdot 5+2\cdot a+2\cdot 5\\ &= x^2+5a+2a+10\\ &= x^2+7a+10\end{aligned}$$

Therefore, the product is $\boxed{x^2+7a+10}$.

Answer 86MYS.

Here

$$\begin{aligned}(2t+1)(t-6) &= 2t(t-6)+1(t-6)\\ &= 2t^2-2t\cdot 6+1\cdot t-1\cdot 6\\ &= 2t^2-12t+t-6\\ &= 2t^2-11t-6\end{aligned}$$

Therefore, the product is $\boxed{2t^2-11t-6}$.

Answer 87MYS.

Here

$$\begin{aligned}(4x-3)(x+1) &= 4x(x+1)-3(x+1)\\ &= 4x^2+4x\cdot 1-3\cdot x-3\cdot 1\\ &= 4x^2+4x-3x-3\\ &= 4x^2+x-3\end{aligned}$$

Therefore, the product is $\boxed{4x^2+x-3}$.

Answer 88MYS.

Here

$$\begin{aligned}(5x+3y)(3x-y) &= 5x(3x-y)+3y(3x-y)\\ &= 15x^2-5x\cdot y+3y\cdot 3x-3y\cdot y\\ &= 15x^2-5xy+9xy-3y^2\\ &= 15x^2+4xy-3y^2\end{aligned}$$

Therefore, the product is $\boxed{15x^2+4xy-3y^2}$.

Answer 89MYS.

Here

$$\begin{aligned}(3a-2b)(4a+7b) &= 3a(4a+7b)-2b(4a+7b)\\ &= 12a^2+3a\cdot 7b-2b\cdot 4a-2b\cdot 7b\\ &= 12a^2+21ab-8ab-14b^2\\ &= 12a^2+13ab-14b^2\end{aligned}$$

Therefore, the product is $\boxed{12a^2+13ab-14b^2}$.