Chapter 8. Polynomials

Ex. 8.1

Answer 1AA.

The surface area of the prism A with width *w*, length *l*, and height *h* is,

$$SA = 2wl + 2wh + 2lh$$
$$= 2(4)(10) + 2(4)(6) + 2(10)(6) \text{ Put } w = 4\,\text{cm}, l = 10\,\text{cm}, h = 6\,\text{cm}$$
$$= 80 + 48 + 120 \text{ Simplify}$$
$$= 248\,\text{cm}^2$$

And, the volume of the prism A is,

$$V = lwh$$
$$= (10)(4)(6)$$
$$= 240\,\text{cm}^3$$

The surface area of the prism B with width *w*, length *l*, and height *h* is,

$$SA = 2wl + 2wh + 2lh$$
$$= 2(6)(15) + 2(6)(9) + 2(15)(9) \text{ Put } w = 6\,\text{cm}, l = 15\,\text{cm}, h = 9\,\text{cm}$$
$$= 180 + 108 + 270 \text{ Simplify}$$
$$= 558\,\text{cm}^2$$

And, the volume of the prism B is,

$$V = lwh$$
$$= (15)(6)(9)$$
$$= 810\,\text{cm}^3$$

Use these values; we can complete the table as follows:

Prism	Dimensions	Surface area (cm^2)	Volume (cm^3)	Surface Area Ratio $\left(\frac{\text{SA of New}}{\text{SA of Original}}\right)$	Volume Ratio $\left(\frac{V\text{ of New}}{V\text{ of Original}}\right)$
Original	2 by 5 by 3	62	30	$\frac{62}{62} = 1$	$\frac{30}{30} = 1$
A	4 by 10 by 6	248	240	$\frac{248}{62} = 4$	$\frac{240}{30} = 8$
B	6 by 15 by 9	558	810	$\frac{558}{62} = 9$	$\frac{810}{30} = 27$

Answer 1CU.

(a)

Consider the following expression.

$$(3x^3)(10x^9)$$

Simplify this expression using product of powers as follows.

$(3x^3)(10x^9) = (3)(10)(x^3 \cdot x^7)$ Using commutative and associative properties

$= (3 \cdot 10)(x^{3+7})$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 30x^{10}$ Simplify

Therefore, the simplified form of the expression $(3x^3)(10x^9)$ is $\boxed{30x^{10}}$.

(b)

Consider the following expression.

$$\left[(5^4)^2\right]^6$$

Simplify this expression using power of a power as follows.

$\left[(5^4)^2\right]^6 = (5^{4\cdot2})^6$ Use power of a power: $(a^m)^n = a^{m\cdot n}$

$= (5^8)^6$ Simplify

$= 5^{8\cdot6}$ Use power of a power: $(a^m)^n = a^{m\cdot n}$

$= 5^{48}$ Simplify

Therefore, the simplified form of the expression $\left[(5^4)^2\right]^6$ is $\boxed{5^{48}}$.

(c)

Consider the following expression.

$$(4xy)^3$$

Simplify this expression using power of a product as follows.

$(4xy)^3 = 4^3x^3y^3$ Use power of a product: $(ab)^n = a^nb^n$

$= 64x^3y^3$ Simplify

Therefore, the simplified form of the expression $(4xy)^3$ is $\boxed{64x^3y^3}$.

Answer 2AA.

The surface area of the prism A with width *w*, length *l*, and height *h* is,

$$SA = 2wl + 2wh + 2lh$$

$= 2(2)(7) + 2(2)(4) + 2(7)(4)$ Put $w = 2\,\text{cm}, l = 7\,\text{cm}, h = 4\,\text{cm}$

$= 28 + 16 + 56$ Simplify

$= 100\,\text{cm}^2$

And, the volume of the prism A is,

$$V = lwh$$

$$= (7)(2)(4)$$

$$= 56\,\text{cm}^3$$

The surface area of the prism B with width *w*, length *l*, and height *h* is,

$$SA = 2wl + 2wh + 2lh$$

$= 2(3)(8) + 2(3)(5) + 2(8)(5)$ Put $w = 3\,\text{cm}, l = 8\,\text{cm}, h = 5\,\text{cm}$

$= 48 + 30 + 80$ Simplify

$= 158\,\text{cm}^2$

And, the volume of the prism B is,

$$V = lwh$$

$$= (8)(3)(5)$$

$$= 120\,\text{cm}^3$$

Use these values; we can complete the table as follows:

Prism	Dimensions	Surface area (cm^2)	Volume (cm^3)	Surface Area Ratio $\left(\frac{\text{SA of New}}{\text{SA of Original}}\right)$	Volume Ratio $\left(\frac{V \text{ of New}}{V \text{ of Original}}\right)$
Original	2 by 5 by 3	62	30	$\frac{62}{62} = 1$	$\frac{30}{30} = 1$
A	4 by 10 by 6	100	56	$\frac{100}{62} = 1.613$	$\frac{56}{30} = 1.87$
B	6 by 15 by 9	158	120	$\frac{158}{62} = 2.55$	$\frac{120}{30} = 4$

Answer 2CU.

(a)

To check whether the monomials $5m^2$ and $(5m)^2$ are equivalent, use power of a product as follows.

$5m^2 = 5m^2$

And,

$(5m)^2 = 5^2 m^2$ Use power of a product: $(ab)^n = a^n b^n$

$= 25m^2$ Simplify

$\neq 5m^2$

Therefore the monomials $5m^2$ and $(5m)^2$ are not equivalent

(b)

To check whether the monomials $(yz)^4$ and y^4z^4 are equivalent, use power of a product as follows.

$(yz)^4 = y^4z^4$ Use power of a product: $(ab)^n = a^n b^n$

And,

$y^4z^4 = y^4z^4$

Therefore the monomials $(yz)^4$ and y^4z^4 are equivalent.

(c)

To check whether the monomials $-3a^2$ and $(-3a)^2$ are equivalent, use power of a product as follows.

$$\begin{aligned}(-3a)^2 &= (-3)^2 a^2 \\ &= 9a^2\end{aligned}$$ Use power of a product: $(ab)^n = a^n b^n$

And,

$-3a^2 = -3a^2$

Therefore the monomials $-3a^2$ and $(-3a)^2$ are not equivalent

(d)

To check whether the monomials $2\left(c^7\right)^3$ and $8c^{21}$ are equivalent, use power of a product as follows.

$2\left(c^7\right)^3 = 2c^{7\cdot 3}$ Use power of a power: $\left(a^m\right)^n = a^{mn}$

$= 2c^{21}$

And,

$8c^{21} = 8c^{21}$

Therefore the monomials $2\left(c^7\right)^3$ and $8c^{21}$ are not equivalent

Answer 3AA.

If we multiply each dimension by 2, we get its dimensions as follows.

The surface area of the prism A with width *w*, length *l*, and height *h* is,

$SA = 2wl + 2wh + 2lh$

$= 2(4)(10) + 2(4)(6) + 2(10)(6)$ Put $w = 4\,\text{cm}, l = 10\,\text{cm}, h = 6\,\text{cm}$

$= 80 + 48 + 120$ Simplify

$= 248\,\text{cm}^2$

And, the volume of the prism A is,

$V = lwh$

$= (10)(4)(6)$

$= 240\,\text{cm}^3$

Therefore,

$$\frac{\text{SA of New}}{\text{SA of Original}} = \frac{248\,\text{cm}^2}{62\,\text{cm}^2} = \boxed{4}$$

And,

$$\frac{V\text{ of New}}{V\text{ of Original}} = \frac{240\,\text{cm}^3}{30\,\text{cm}^3} = \boxed{8}$$

Answer 3CU.

Consider the following expression.

$$(5^2)(5^9)$$

Simplify this expression using product of powers as follows.

$(5^2)(5^9) = 5^{2+9}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 5^{11}$ Simplify

Therefore, the simplified form of the expression $(5^2)(5^9)$ is 5^{11}.

So, Poloma simplification is correct.

Answer 4AA.

If we multiply each dimension by 3, we get its dimensions as follows.

The surface area of the prism B with width *w*, length *l*, and height *h* is,

$SA = 2wl + 2wh + 2lh$

$= 2(6)(15) + 2(6)(9) + 2(15)(9)$ Put $w = 6\,\text{cm}, l = 15\,\text{cm}, h = 9\,\text{cm}$

$= 180 + 108 + 270$ Simplify

$= 558\,\text{cm}^2$

And, the volume of the prism B is,

$V = lwh$

$= (15)(6)(9)$

$= 810\,\text{cm}^3$

Therefore,

$$\frac{\text{SA of New}}{\text{SA of Original}} = \frac{558\,\text{cm}^2}{62\,\text{cm}^2} = \boxed{9}$$

And,

$$\frac{V\text{ of New}}{V\text{ of Original}} = \frac{810\,\text{cm}^3}{30\,\text{cm}^3} = \boxed{27}$$

Answer 4CU.

To determine whether the expression $5-7d$ is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression $5-7d=5+(-7d)$ involves the addition, not the product of a number and the variable.

So, by the definition of a monomial, the expression $5-7d$ is not a monomial.

Answer 5AA.

If we multiply each dimension by a, we get its dimensions as follows.

The surface area of the prism C with width *w*, length *l*, and height *h* is,

$$SA = 2wl + 2wh + 2lh$$
$$= 2(2a)(5a) + 2(2a)(3a) + 2(5a)(3a)$$

Put $w = 2a\,\text{cm}, l = 5a\,\text{cm}, h = 3a\,\text{cm}$

$$= 20a^2 + 12a^2 + 30a^2$$
$$= 62a^2$$
Simplify

And, the volume of the prism C is,

$$V = lwh$$
$$= (5a)(2a)(3a)$$
$$= 30a^3\text{cm}^3$$

Therefore,

$$\frac{\text{SA of New}}{\text{SA of Original}} = \frac{62a^2\,\text{cm}^2}{62\,\text{cm}^2}$$
$$= \boxed{a^2}$$

And,

$$\frac{V\text{ of New}}{V\text{ of Original}} = \frac{30a^3\,\text{cm}^3}{30\,\text{cm}^3}$$
$$= \boxed{a^3}$$

From this, we observe that, if we multiply each dimension of the prism by *a*, the surface area of the new prism is a^2 times of the surface area of the original prism.

And, the volume of the new prism is a^3 times the volume of the original prism.

Answer 5CU.

To determine whether the expression $\frac{4a}{3b}$ is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression $\frac{4a}{3b}$ involves the division of two variables a and b.

So, by the definition of a monomial, the expression $\frac{4a}{3b}$ is not a monomial.

Answer 6AA.

The original dimensions of the cylinder are $r = 4\text{cm}, h = 5\text{cm}$.

The surface area of the original cylinder with $r = 4\text{cm}, h = 5\text{cm}$ is,

$$\begin{aligned} SA &= \left(2\pi r^2 + 2\pi rh\right)\text{cm}^2 \\ &= \left(2\pi(4)^2 + 2\pi(4)(5)\right)\text{cm}^2 \\ &= 72\pi\text{cm}^2 \end{aligned}$$

And, the volume of the original cylinder is,

$$V = \pi r^2 h\,\text{cm}^3$$

$$= \pi(4)^2(5)\text{cm}^3$$

$$= 80\pi\,\text{cm}^3$$

If we multiply each dimension by a, we get the dimensions of the new cylinder as follows.

$$r = 4a\text{cm}, h = 5a\text{cm}$$

The surface area of the new cylinder is,

$$\begin{aligned} SA &= \left(2\pi r^2 + 2\pi rh\right)\text{cm}^2 \\ &= \left(2\pi(4a)^2 + 2\pi(4a)(5a)\right)\text{cm}^2 \\ &= 72\pi a^2\text{cm}^2 \end{aligned}$$

And, the volume of the new cylinder is,

$$V = \pi r^2 h\,\text{cm}^3$$

$$= \pi(4a)^2(5a)\text{cm}^3$$

$$= 80\pi a^3\,\text{cm}^3$$

Therefore,

$$\frac{\text{SA of New}}{\text{SA of Original}} = \frac{72\pi a^2\ \text{cm}^2}{72\pi\ \text{cm}^2}$$
$$= \boxed{a^2}$$

And,

$$\frac{V\ \text{of New}}{V\ \text{of Original}} = \frac{80\pi a^3\ \text{cm}^3}{80\pi\ \text{cm}^3}$$
$$= \boxed{a^3}$$

From this, we observe that, if we multiply each dimension of the cylinder by *a*, the surface area of the new cylinder is a^2 times of the surface area of the original cylinder.

And, the volume of the new cylinder is a^3 times the volume of the original cylinder.

So, we observe that the conjectures made in exercise 5 hold true for cylinders also.

Answer 6CU.

To determine whether the expression n is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression n involves the variable n.

So, by the definition of a monomial, the expression n is a monomial.

Answer 7CU.

Given expression is,

$$x\left(x^4\right)\left(x^6\right)$$

Simplify this expression as follows:

$x\left(x^4\right)\left(x^6\right) = x^{1+4+6}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= x^{11}$ Simplify

Therefore, the simplified form of the expression $x\left(x^4\right)\left(x^6\right)$ is $\boxed{x^{11}}$

Answer 8CU.

Given expression is,

$$(4a^4b)(9a^2b^3)$$

Simplify this expression as follows:

$(4a^4b)(9a^2b^3)=(4)(9)(a^4\cdot a^2)(b^1\cdot b^3)$ Using commutative and associative properties

$=36a^{4+2}b^{1+3}$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=36a^6b^4$ Simplify

Therefore, the simplified form of the expression $(4a^4b)(9a^2b^3)$ is $\boxed{36a^6b^4}$

Answer 9CU.

Consider the following expression.

$$\left[(2^3)^2\right]^3$$

Simplify this expression using power of a power as follows.

$\left[(2^3)^2\right]^3=(2^{3\cdot 2})^3$ Use power of a power: $(a^m)^n=a^{m\cdot n}$

$=(2^6)^3$ Simplify

$=2^{6\cdot 3}$ Use power of a power: $(a^m)^n=a^{m\cdot n}$

$=2^{18}$ Simplify

Therefore, the simplified form of the expression $\left[(2^3)^2\right]^3$ is $\boxed{2^{18}}$.

Answer 10CU.

Consider the following expression.

$$(3y^5z)^2$$

Simplify this expression using power of a product as follows.

$(3y^5z)^2=3^2(y^5)^2z^2$ Use power of a product: $(ab)^n=a^nb^n$

$=3^2y^{5\cdot 2}z^2$ Use power of a power: $(a^m)^n=a^{m\cdot n}$

$=9y^{10}z^2$ Simplify

Therefore, the simplified form of the expression $(3y^5z)^2$ is $\boxed{9y^{10}z^2}$.

Answer 11CU.

Given expression is,

$$\left(-4mn^2\right)\left(12m^2n\right)$$

Simplify this expression as follows:

$\left(-4mn^2\right)\left(12m^2n\right)=(-4)(12)\left(m^1\cdot m^2\right)\left(n^2\cdot n^1\right)$ Using commutative and associative properties

$=-48m^{1+2}n^{2+1}$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=-48m^3n^3$ Simplify

Therefore, the simplified form of the expression $\left(-4mn^2\right)\left(12m^2n\right)$ is $\boxed{-48m^3n^3}$

Answer 12CU.

Given expression is,

$$\left(-2v^3w^4\right)^3\left(-3vw^3\right)^2$$

Simplify this expression as follows:

$\left(-2v^3w^4\right)^3\left(-3vw^3\right)^2=\left((-2)^3\left(v^3\right)^3\left(w^4\right)^3\right)\left((-3)^2v^2\left(w^3\right)^2\right)$ Use power of a product:

$(ab)^n=a^nb^n$

$=\left(-8\left(v^{3\cdot3}\right)\left(w^{4\cdot3}\right)\right)\left(9v^2\left(w^{3\cdot2}\right)\right)$ Use power of a power: $\left(a^m\right)^n=a^{m\cdot n}$

$=\left(-8v^9w^{12}\right)\left(9v^2w^6\right)$ Simplify

$=(-8)(9)\left(v^9\cdot v^2\right)\left(w^{12}\cdot w^6\right)$ Using commutative and associative properties

$=-72\left(v^{9+2}w^{12+6}\right)$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=-72v^{11}w^{18}$ Simplify

Therefore, the simplified form of the expression $\left(-2v^3w^4\right)^3\left(-3vw^3\right)^2$ is $\boxed{-72v^{11}w^{18}}$

Answer 13CU.

The area of the triangle is,

$\frac{1}{2}(\text{base})(\text{height})=\frac{1}{2}\left(5n^3\right)\left(2n^2\right)$ From the figure

$=\frac{1}{\cancel{2}}\left(5n^3\right)\left(\cancel{2}n^2\right)$ Cancel out the common term

$=5\left(n^3\cdot n^2\right)$

$=5n^{3+2}$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=\boxed{5n^5}$

Answer 14CU.

The area of the triangle is,

$\frac{1}{2}(\text{base})(\text{height}) = \frac{1}{2}(3a^4b)(4ab^5)$ From the figure

$= \frac{1}{\cancel{2}_1}(3a^4b)\left(\cancel{4}^2ab^5\right)$ Cancel out the common term

$= (3)(2)(a^4 \cdot a^1)(b^1 \cdot b^5)$

Using commutative and associative properties

$= 6a^{4+1}b^{1+5}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= \boxed{6a^5b^6}$ Simplify

Answer 15PA.

To determine whether the expression 12 is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression 12 involves the number 12.

So, by the definition of a monomial, the expression 12 is a monomial.

Answer 16PA.

To determine whether the expression $4x^3$ is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression $4x^3$ involves the number 4 and the variable x.

So, by the definition of a monomial, the expression $4x^3$ is a monomial.

Answer 17PA.

To determine whether the expression $a-2b$ is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression $a-2b = a+(-2b)$ involves the addition, not the product of two variables.

So, by the definition of a monomial, the expression $a-2b$ is not a monomial.

Answer 18PA.

To determine whether the expression $4n+5m$ is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression $4n+5m$ involves the addition, not the product of two variables.

So, by the definition of a monomial, the expression $4n+5m$ is not a monomial.

Answer 19PA.

To determine whether the expression $\frac{x}{y^2}$ is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression $\frac{x}{y^2}$ involves the division of two variables x and y.

So, by the definition of a monomial, the expression $\frac{x}{y^2}$ is not a monomial.

Answer 20PA.

To determine whether the expression $\frac{1}{5}abc^{14}$ is a monomial, use the definition of monomial as follows.

A monomial is a variable, a number, or a product of a number and one more variables.

And, an expression involving the division of variables is not monomial.

The expression $\frac{1}{5}abc^{14}$ is a product of the number $\frac{1}{5}$ and the three variables a,b,c.

So, by the definition of a monomial, the expression $\frac{1}{5}abc^{14}$ is a monomial.

Answer 21PA.

Given expression is,

$$\left(ab^{4}\right)\left(ab^{2}\right)$$

Simplify this expression as follows:

$\left(ab^{4}\right)\left(ab^{2}\right)=\left(a^{1}\cdot a^{1}\right)\left(b^{4}\cdot b^{2}\right)$ Using commutative and associative properties

$=a^{1+1}b^{4+2}$ Use product of powers: $a^{m}\cdot a^{n}=a^{m+n}$

$=a^{2}b^{6}$ Simplify

Therefore, the simplified form of the expression $\left(ab^{4}\right)\left(ab^{2}\right)$ is $\boxed{a^{2}b^{6}}$

Answer 22PA.

Given expression is,

$$\left(p^{5}q^{4}\right)\left(p^{2}q^{1}\right)$$

Simplify this expression as follows:

$\left(p^{5}q^{4}\right)\left(p^{2}q^{1}\right)=\left(p^{5}\cdot p^{2}\right)\left(q^{4}\cdot q^{1}\right)$ Using commutative and associative properties

$=p^{5+2}\cdot q^{4+1}$ Use product of powers: $a^{m}\cdot a^{n}=a^{m+n}$

$=p^{7}\cdot q^{5}$ Simplify

Therefore, the simplified form of the expression $\left(p^{5}q^{4}\right)\left(p^{2}q^{1}\right)$ is $\boxed{p^{7}\cdot q^{5}}$

Answer 23PA.

Given expression is,

$$\left(-7c^{3}d^{4}\right)\left(4cd^{3}\right)$$

Simplify this expression as follows:

$\left(-7c^{3}d^{4}\right)\left(4cd^{3}\right)=(-7)(4)\left(c^{3}\cdot c^{1}\right)\left(d^{4}\cdot d^{3}\right)$ Using commutative and associative properties

$=-28c^{3+1}\cdot d^{4+3}$ Use product of powers: $a^{m}\cdot a^{n}=a^{m+n}$

$=-28c^{4}d^{7}$ Simplify

Therefore, the simplified form of the expression $\left(-7c^{3}d^{4}\right)\left(4cd^{3}\right)$ is $\boxed{-28c^{4}d^{7}}$

Answer 24PA.

Given expression is,

$$\left(-3j^7k^5\right)\left(-8jk^8\right)$$

Simplify this expression as follows:

$\left(-3j^7k^5\right)\left(-8jk^8\right)=(-3)(-8)\left(j^7\cdot j^1\right)\left(k^5\cdot k^8\right)$ Using commutative and associative properties

$=24\left(j^{7+1}\cdot k^{5+8}\right)$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=24j^8k^{13}$ Simplify

Therefore, the simplified form of the expression $\left(-3j^7k^5\right)\left(-8jk^8\right)$ is $\boxed{24j^8k^{13}}$

Answer 25PA.

Given expression is,

$$\left(5a^2b^3c^4\right)\left(6a^3b^4c^2\right)$$

Simplify this expression as follows:

$$\left(5a^2b^3c^4\right)\left(6a^3b^4c^2\right)=(5)(6)\left(a^2\cdot a^3\right)\left(b^3\cdot b^4\right)\left(c^4\cdot c^2\right)$$

Using commutative and associative properties

$=30\left(a^{2+3}\cdot b^{3+4}\cdot c^{4+2}\right)$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=30a^5b^7c^6$ Simplify

Therefore, the simplified form of the expression $\left(5a^2b^3c^4\right)\left(6a^3b^4c^2\right)$ is $\boxed{30a^5b^7c^6}$

Answer 26PA.

Given expression is,

$$\left(10xy^5z^3\right)\left(3x^4y^6z^3\right)$$

Simplify this expression as follows:

$$\left(10xy^5z^3\right)\left(3x^4y^6z^3\right)=(10)(3)\left(x^1\cdot x^4\right)\left(y^5\cdot y^6\right)\left(z^3\cdot z^3\right)$$

Using commutative and associative properties

$=30\left(x^{1+4}\cdot y^{5+6}\cdot z^{3+3}\right)$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=30x^5y^{11}z^6$ Simplify

Therefore, the simplified form of the expression $\left(10xy^5z^3\right)\left(3x^4y^6z^3\right)$ is $\boxed{30x^5y^{11}z^6}$

Answer 27PA.

Given expression is,

$$\left(9pq^7\right)^2$$

Simplify this expression as follows:

$\left(9pq^7\right)^2 = 9^2 p^2 \left(q^7\right)^2$ Use power of a product: $(ab)^n = a^n b^n$

$= 81p^2q^{7\cdot 2}$ Use power of a power: $\left(a^m\right)^n = a^{mn}$

$= 81p^2q^{14}$ Simplify

Therefore, the simplified form of the expression $\left(9pq^7\right)^2$ is $\boxed{81p^2q^{14}}$

Answer 28PA.

Given expression is,

$$\left(7b^3c^6\right)^3$$

Simplify this expression as follows:

$\left(7b^3c^6\right)^3 = 7^3\left(b^3\right)^3\left(c^6\right)^3$ Use power of a product: $(ab)^n = a^n b^n$

$= 343\left(b^{3\cdot 3}c^{6\cdot 3}\right)$ Use power of a power: $\left(a^m\right)^n = a^{mn}$

$= 343b^9c^{18}$ Simplify

Therefore, the simplified form of the expression $\left(7b^3c^6\right)^3$ is $\boxed{343b^9c^{18}}$

Answer 29PA.

Consider the following expression.

$$\left[\left(3^2\right)^4\right]^2$$

Simplify this expression using power of a power as follows.

$\left[\left(3^2\right)^4\right]^2 = \left(3^{2\cdot 4}\right)^2$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= \left(3^8\right)^2$ Simplify

$= 3^{8\cdot 2}$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= 3^{16}$ Simplify

Therefore, the simplified form of the expression $\left[\left(3^2\right)^4\right]^2$ is $\boxed{3^{16}}$.

Answer 30PA.

Consider the following expression.

$$\left[\left(4^2\right)^3\right]^2$$

Simplify this expression using power of a power as follows.

$\left[\left(4^2\right)^3\right]^2 = \left(4^{2\cdot 3}\right)^2$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= \left(4^6\right)^2$ Simplify

$= 4^{6\cdot 2}$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= 4^{12}$ Simplify

Therefore, the simplified form of the expression $\left[\left(4^2\right)^3\right]^2$ is $\boxed{4^{12}}$.

Answer 31PA.

Consider the following expression.

$$\left(0.5x^3\right)^2$$

Simplify this expression using power of a power as follows.

$\left(0.5x^3\right)^2 = \left(0.5\right)^2\left(x^3\right)^2$ Use power of a product: $\left(ab\right)^n = a^n b^n$

$= 0.25x^{3\cdot 2}$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= 0.25x^6$ Simplify

Therefore, the simplified form of the expression $\left(0.5x^3\right)^2$ is $\boxed{0.25x^6}$.

Answer 32PA.

Consider the following expression.

$$\left(0.4h^5\right)^3$$

Simplify this expression using power of a power as follows.

$\left(0.4h^5\right)^3 = \left(0.4\right)^3\left(h^5\right)^3$ Use power of a product: $\left(ab\right)^n = a^n b^n$

$= 0.064h^{5\cdot 3}$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= 0.064h^{15}$ Simplify

Therefore, the simplified form of the expression $\left(0.4h^5\right)^3$ is $\boxed{0.064h^{15}}$.

Answer 33PA.

Consider the following expression.

$$\left(-\frac{3}{4}c\right)^3$$

Simplify this expression as follows.

$\left(-\frac{3}{4}c\right)^3 = \left(-\frac{3}{4}\right)^3 (c)^3$ Use power of a product: $(ab)^n = a^n b^n$

$= -\frac{27}{64}c^3$ Simplify

Therefore, the simplified form of the expression $\left(-\frac{3}{4}c\right)^3$ is $\boxed{-\frac{27}{64}c^3}$.

Answer 34PA.

Consider the following expression.

$$\left(\frac{4}{5}a^2\right)^2$$

Simplify this expression using power of a power as follows.

$\left(\frac{4}{5}a^2\right)^2 = \left(\frac{4}{5}\right)^2 \left(a^2\right)^2$ Use power of a product: $(ab)^n = a^n b^n$

$= \frac{16}{25}a^{2\cdot 2}$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= \frac{16}{25}a^4$ Simplify

Therefore, the simplified form of the expression $\left(\frac{4}{5}a^2\right)^2$ is $\boxed{\frac{16}{25}a^4}$.

Answer 35PA.

Consider the following expression.

$$(4cd)^2(-3d^2)^3$$

Simplify this expression as follows.

$(4cd)^2(-3d^2)^3 = (4^2c^2d^2)((-3)^3(d^2)^3)$ Use power of a product: $(ab)^n = a^n b^n$

$= (16c^2d^2)(-27d^{2\cdot 3})$ Use power of a power: $(a^m)^n = a^{m\cdot n}$

$= (16c^2d^2)(-27d^6)$ Simplify

$= (16)(-27)(c^2)(d^2\cdot d^6)$

Using commutative and associative properties

$= -432(c^2d^{2+6})$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= -432c^2d^8$

Therefore, the simplified form of the expression $(4cd)^2(-3d^2)^3$ is $\boxed{-432c^2d^8}$.

Answer 36PA.

Consider the following expression.

$$(-2x^5)^3(-5xy^6)^2$$

Simplify this expression as follows.

$(-2x^5)^3(-5xy^6)^2 = ((-2)^3(x^5)^3)((-5)^2x^2(y^6)^2)$ Use power of a product: $(ab)^n = a^n b^n$

$= (-8x^{5\cdot 3})(25x^2y^{6\cdot 2})$ Use power of a power: $(a^m)^n = a^{m\cdot n}$

$= (-8x^{15})(25x^2y^{12})$ Simplify

$= (-8)(25)(x^{15}\cdot x^2)y^{12}$ Using commutative and associative properties

$= -200x^{15+2}y^{12}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= -200x^{17}y^{12}$ Simplify

Therefore, the simplified form of the expression $(-2x^5)^3(-5xy^6)^2$ is $\boxed{-200x^{17}y^{12}}$.

Answer 37PA.

Consider the following expression.

$$\left(2ag^2\right)^4\left(3a^2g^3\right)^2$$

Simplify this expression as follows.

$$\left(2ag^2\right)^4\left(3a^2g^3\right)^2 = \left(2^4a^4\left(g^2\right)^4\right)\left(3^2\left(a^2\right)^2\left(g^3\right)^2\right)$$ Use power of a product: $(ab)^n = a^nb^n$

$$=\left(16a^4g^{2\cdot 4}\right)\left(9a^{2\cdot 2}g^{3\cdot 2}\right)$$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$$=\left(16a^4g^8\right)\left(9a^4g^6\right)$$ Simplify

$$=(16)(9)\left(a^4\cdot a^4\right)\left(g^8\cdot g^6\right)$$ Using commutative and associative properties

$$=144\left(a^{4+4}\cdot g^{8+6}\right)$$ Use product of powers: $a^m\cdot a^n = a^{m+n}$

$$=144a^8g^{14}$$ Simplify

Therefore, the simplified form of the expression $\left(2ag^2\right)^4\left(3a^2g^3\right)^2$ is $\boxed{144a^8g^{14}}$.

Answer 38PA.

Consider the following expression.

$$\left(2m^2n^3\right)^3\left(3m^3n\right)^4$$

Simplify this expression as follows.

$$\left(2m^2n^3\right)^3\left(3m^3n\right)^4 = \left(2^3\left(m^2\right)^3\left(n^3\right)^3\right)\left(3^4\left(m^3\right)^4n^4\right)$$ Use power of a product: $(ab)^n = a^nb^n$

$$=\left(8\left(m^6\right)\left(n^9\right)\right)\left(81\left(m^{12}\right)n^4\right)$$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$$=(8)(81)\left(m^6\cdot m^{12}\right)\left(n^9\cdot n^4\right)$$ Using commutative and associative properties

$$=648\left(m^{6+12}\cdot n^{9+4}\right)$$ Use product of powers: $a^m\cdot a^n = a^{m+n}$

$$=648m^{18}n^{13}$$

Therefore, the simplified form of the expression $\left(2m^2n^3\right)^3\left(3m^3n\right)^4$ is $\boxed{648m^{18}n^{13}}$.

Answer 39PA.

Consider the following expression.

$$(8y)^3\left(-3x^2y^2\right)\left(\frac{3}{8}xy^4\right)$$

Simplify this expression as follows.

$(8y)^3\left(-3x^2y^2\right)\left(\frac{3}{8}xy^4\right)=\left(8^3y^3\right)\left(-3x^2y^2\right)\left(\frac{3}{8}xy^4\right)$ Use power of a product: $(ab)^n=a^nb^n$

$$=\left(8^3\right)(-3)\left(\frac{3}{8}\right)\left(x^2\cdot x^1\right)\left(y^3\cdot y^2\cdot y^4\right)$$

Using commutative and associative properties

$=-576x^{2+1}y^{3+2+4}$ Use product of powers: $a^m\cdot a^n=a^{m+n}$

$=-576x^3y^9$ Simplify

Therefore, the simplified form of the expression $(8y)^3\left(-3x^2y^2\right)\left(\frac{3}{8}xy^4\right)$ is $\boxed{-576x^3y^9}$.

Answer 40PA.

Consider the following expression.

$$\left(\frac{4}{7}m\right)^2(49m)(17p)\left(\frac{1}{34}p^5\right)$$

Simplify this expression as follows.

$$\left(\frac{4}{7}m\right)^2(49m)(17p)\left(\frac{1}{34}p^5\right)=\left(\frac{4}{7}\right)^2m^2(49m)(17p)\left(\frac{1}{34}p^5\right)$$

Use power of a product: $(ab)^n=a^nb^n$

$$=\frac{16}{49}m^2(49m)(17p)\left(\frac{1}{34}p^5\right)$$

Simplify

$$=16m^2(m)(p)\left(\frac{1}{2}p^5\right)$$

$$=16\left(\frac{1}{2}\right)\left(m^2\cdot m^1\right)\left(p^5\cdot p\right)$$

Using commutative and associative properties

$$=8\left(m^{2+1}\cdot p^{5+1}\right)$$

Use product of powers: $a^m\cdot a^n=a^{m+n}$

$$=8m^3p^6$$

Simplify

Therefore, the simplified form of the expression $\left(\frac{4}{7}m\right)^2(49m)(17p)\left(\frac{1}{34}p^5\right)$ is $\boxed{8m^3p^6}$.

Answer 41PA.

Consider the following expression.

$$\left(-2b^3\right)^4 - 3\left(-2b^4\right)^3$$

Simplify this expression as follows.

$\left(-2b^3\right)^4 - 3\left(-2b^4\right)^3 = (-2)^4\left(b^3\right)^4 - 3(-2)^3\left(b^4\right)^3$ Use power of a product: $(ab)^n = a^n b^n$

$= 16\left(b^{3\cdot 4}\right) - 3(-8)\left(b^{4\cdot 3}\right)$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= 16\left(b^{12}\right) + 24\left(b^{12}\right)$ Simplify

$= 40b^{12}$

Therefore, the simplified form of the expression $\left(-2b^3\right)^4 - 3\left(-2b^4\right)^3$ is $\boxed{40b^{12}}$.

Answer 42PA.

Consider the following expression.

$$2\left(-5y^3\right)^2 + \left(-3y^3\right)^3$$

Simplify this expression as follows.

$2\left(-5y^3\right)^2 + \left(-3y^3\right)^3 = 2(-5)^2\left(y^3\right)^2 + (-3)^3\left(y^3\right)^3$ Use power of a product: $(ab)^n = a^n b^n$

$= 50y^{3\cdot 2} - 27y^{3\cdot 3}$ Use power of a power: $\left(a^m\right)^n = a^{m\cdot n}$

$= 50y^6 - 27y^9$ Simplify

Therefore, the simplified form of the expression $2\left(-5y^3\right)^2 + \left(-3y^3\right)^3$ is $\boxed{50y^6 - 27y^9}$.

Answer 43PA.

Area of the rectangle is,

$$(\text{length})(\text{breadth}) = \left(5f^4g^3\right)\left(3fg^2\right)$$

Simplify this expression as follows.

$\left(5f^4g^3\right)\left(3fg^2\right) = (5)(3)\left(f^4 \cdot f^1\right)\left(g^3 \cdot g^2\right)$ Using commutative and associative properties

$= 15f^{4+1}g^{3+2}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 15f^5g^5$ Simplify

Therefore, the simplified form of the area of the rectangle is $15f^5g^5$.

This is a monomial, because it is a product of a number and two variables.

Answer 44PA.

Area of the square is,

$$(\text{side})^2 = (a^2b)^2$$

Simplify this expression as follows.

$(a^2b)^2 = (a^2)^2 b^2$ Use power of a product: $(ab)^n = a^n b^n$

$= a^{2\cdot 2}b^2$ Use power of a power: $(a^m)^n = a^{mn}$

$= a^4b^2$ Simplify

Therefore, the simplified form of the area of the square is a^4b^2.

This is a monomial, because it is a product of two variables.

Answer 45PA.

Area of the circle is,

$$\pi r^2 = \pi(7x^4)^2$$

Simplify this expression as follows.

$\pi(7x^4)^2 = \pi(7^2)(x^4)^2$ Use power of a product: $(ab)^n = a^n b^n$

$= \pi(49)x^{4\cdot 2}$ Use power of a power: $(a^m)^n = a^{mn}$

$= 49\pi x^8$ Simplify

Therefore, the simplified form of the area of the circle is $49\pi x^8$.

This is a monomial, because it is a product of a number and one variable.

Answer 46PA.

Volume of the cube with side $4k^3$ is,

$$(\text{side})^3 = (4k^3)^3$$

Simplify this expression as follows.

$(4k^3)^3 = 4^3(k^3)^3$ Use power of a product: $(ab)^n = a^n b^n$

$= 64k^{3\cdot 3}$ Use power of a power: $(a^m)^n = a^{mn}$

$= 64k^9$ Simplify

Therefore, the simplified form of the volume of the cube is $64k^9$.

This is a monomial, because it is a product of a number and one variable.

Answer 47PA.

Volume of the rectangular parallelepiped is,

$(\text{length})(\text{width})(\text{height}) = (xy^3)(y)(x^2y)$

Simplify this expression as follows.

$(xy^3)(y)(x^2y) = (x^1 \cdot x^2)(y^3 \cdot y \cdot y)$ Using commutative and associative properties

$= (x^{1+2})(y^{3+1+1})$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= x^3y^5$ Simplify

Therefore, the simplified form of the volume of the rectangular parallelepiped is x^3y^5.

This is a monomial, because it is a product of two variables.

Answer 48PA.

Volume of the cylinder is,

$\pi r^2 h$, where $r = 2n, h = 4n^3$

Simplify this expression as follows.

$\pi r^2 h = \pi(2n)^2(4n^3)$ Put the values of *r* and *h*

$= \pi(2^2n^2)(4n^3)$ Use power of a product: $(ab)^n = a^nb^n$

$= \pi(4n^2)(4n^3)$ Simplify

$= (4)(4)\pi(n^2 \cdot n^3)$

$= 16\pi n^{2+3}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 16\pi n^5$

Therefore, the simplified form of the volume of the cylinder is $6\pi n^5$.

This is a monomial, because it is a product of a number and a variable.

Answer 49PA.

Consider that the first transatlantic telephone cable has 51 amplifiers along its length.

And, each amplifier strengthens the signal on the cable 10^6 times.

After the signal passes through the second amplifier, the signal has been boosted $10^6 \cdot 10^6$ times.

Simplify this expression as follows.

$10^6 \cdot 10^6 = 10^{6+6}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 10^{12}$ Simplify

Therefore the simplified form of the expression $10^6 \cdot 10^6$ times is $\boxed{10^{12} \text{ times}}$.

Answer 50PA.

Consider that the first transatlantic telephone cable has 51 amplifiers along its length.

And, each amplifier strengthens the signal on the cable 10^6 times.

The number of times the signal has been boosted after it has passed through the first four amplifiers is,

$10^6 \cdot 10^6 \cdot 10^6 \cdot 10^6 = 10^{6+6+6+6}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 10^{24}$ Simplify

Therefore the simplified form of the expression $10^6 \cdot 10^6 \cdot 10^6 \cdot 10^6$ is $\boxed{10^{24}}$.

Answer 51PA.

For a certain car, the collision impact I is given by,

$I = 2s^2$, where s represents the speed in km/min

If the speed of the car is 1 km/min, then the collision impact is,

$$I_1 = 2(1)^2 \quad \text{Put } s = 1$$

$$= \boxed{2}$$

If the speed of the car is 2kms/min, then the collision impact is,

$$I_2 = 2(2)^2 \quad \text{Put } s = 2$$

$$= \boxed{8}$$

If the speed of the car is 4kms/min, then the collision impact is,

$$I_3 = 2(4)^2 \quad \text{Put } s = 4$$

$$= \boxed{32}$$

Answer 52PA.

For a certain car, the collision impact I is given by,

$I = 2s^2$, where s represents the speed in km/min

If the speed of the car is doubles, then the collision impact is,

$$I_1 = 2(2s)^2 \quad \text{Replace } s \text{ by } 2s$$
$$= 8s^2$$
$$= 4(2s^2)$$
$$= 4I$$

Therefore, the collision impact is 4 times the original collision impact if the speed of the car is doubles.

Answer 53PA.

There are 2^{12} ways to answer to answer 12 questions.

And, there are 2^{10} ways to answer to answer 10 questions.

Therefore, the number of ways to answer 22 questions is,

$2^{12} \times 2^{10} = 2^{12+10}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 2^{22}$ Simplify

So, the required number of ways is $\boxed{2^{22}}$

Answer 54PA.

There are 2^{12} ways to answer to answer 12 questions.

And, there are 2^{10} ways to answer to answer 10 questions.

Therefore, the number of ways to answer 22 questions is,

$2^{12} \times 2^{10} = 2^{12+10}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= 2^{22}$ Simplify

If a student guesses on each question, then the probability of answering all 22 questions is,

$$\frac{\text{The number of chances to correct all questions correctly}}{\text{The total number of chances to answer 22 questions}} = \boxed{\frac{1}{2^{22}}}$$

Answer 55PA.

For any real number *a* consider the following equation,

$$(-a)^2 = -a^2$$

To verify that; whether this equation is true simplify the left hand side of the equation first.

$$(-a)^2 = (-a)(-a)$$

$= (-1)(-1)(a^1 \cdot a^1)$ Use commutative and associative properties

$= 1a^{1+1}$ Use product of powers: $a^m \cdot a^n = a^{m+n}$

$= a^2$

Since the right hand side of the equation is $-a^2$, the given equation is not true.

Answer 56PA.

For any two real numbers a, b and for all integers m, n, p, consider the following equation.

$$(a^m b^n)^p = a^{mp} b^{np}$$

To verify that; whether this equation is true simplify the left hand side of the equation first.

$(a^m b^n)^p = (a^m)^p (b^n)^p$ Use power of product: $(ab)^n = a^n b^n$

$= a^{mp} b^{np}$ Use power of a power: $(a^m)^n = a^{mn}$

Therefore the given equation is true.

Answer 57PA.

For any two real numbers a, b and for all integers n, consider the following equation.

$$(a+b)^n = a^n + b^n$$

To verify that; whether this equation is true take $a = 3, b = 5, n = 2$

$$(a+b)^n = a^n + b^n$$

$$(3+6)^2 = 3^2 + 5^2$$

$$9^2 = 9 + 25$$

$$81 = 34$$

This is not true.

Therefore the given equation is not true.

Answer 58PA.

The breaking distance of a car required for a speed of s miles is given as,

$$d_1 = \frac{1}{20}s^2$$

If the speed s is doubled, then the breaking distance of a car is,

$$d_2 = \frac{1}{20}(2s)^2 \text{ Replace } s \text{ by } 2s$$

$$= \frac{4s^2}{20}$$

Therefore,

$$\frac{d_1}{d_2} = \frac{\frac{1}{20}s^2}{\frac{4s^2}{20}}$$

$$\frac{d_1}{d_2} = \frac{s^2}{4s^2}$$

$$\frac{d_1}{d_2} = \frac{1}{4}$$

$$d_2 = 4d_1$$

Therefore, the doubling speed quadruple distance.

Answer 29PA.

Given expression is,

$$4^2 \cdot 4^5$$

Simplify this expression as follows:

$$4^2 \cdot 4^5 = 4^{2+5} \text{ Use product of powers: } a^m \cdot a^n = a^{m+n}$$

$$= 4^7 \text{ Simplify}$$

Therefore, the simplified form of the expression $4^2 \cdot 4^5$ is 4^7

So, the correct choice is $\boxed{\text{D}}$

Answer 60PA.

Volume of the cube given in the figure is,

$$(\text{side})^3 = (5x)^3$$

Simplify this expression as follows:

$(5x)^3 = 5^3 \cdot x^3$ Use power of product: $(ab)^n = a^n b^n$

$= 125x^3$ Simplify

Therefore the volume of the required cube is $\boxed{125x^3}$

Answer 61MYS.

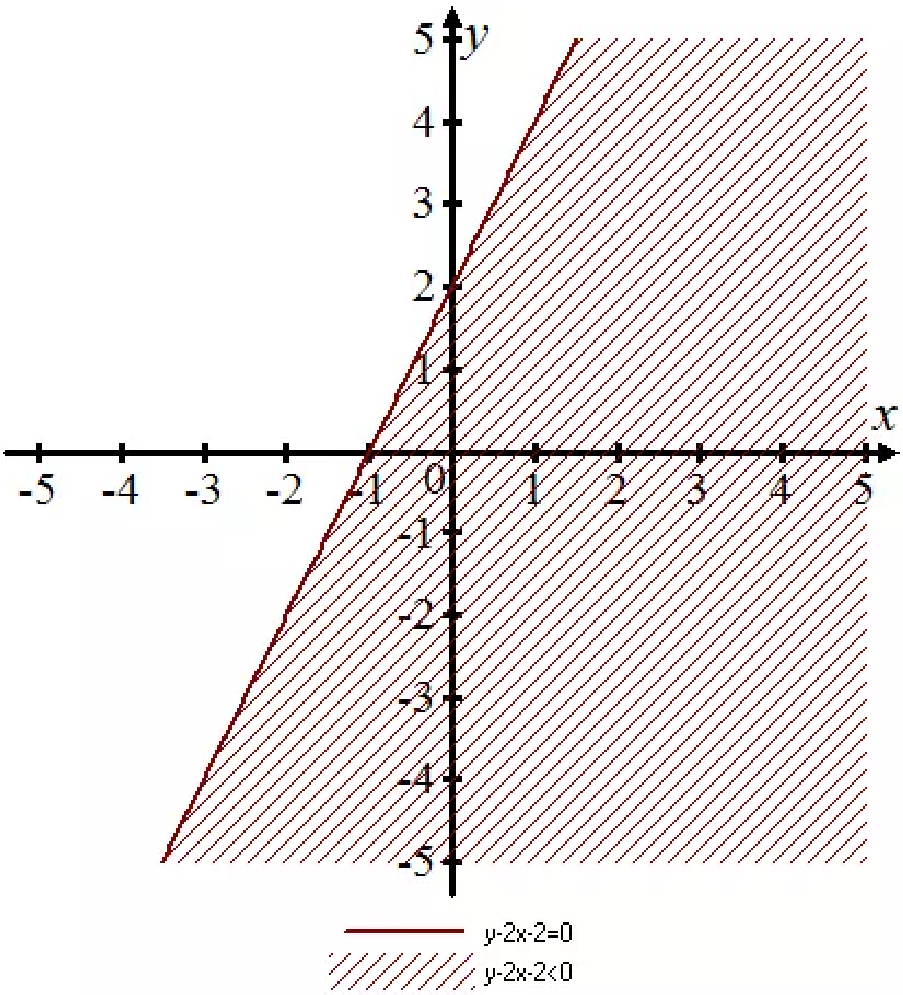
Consider the system of inequalities:

$$y \le 2x + 2$$
$$y \ge -x - 1$$

Put $(0,0)$ in the first inequality, we get

$$0 \le 2(0) + 2$$
$$0 \le 2, \text{true}$$

Therefore, the solution of the inequality $y \le 2x + 2$ lies on the half-plane towards the origin.

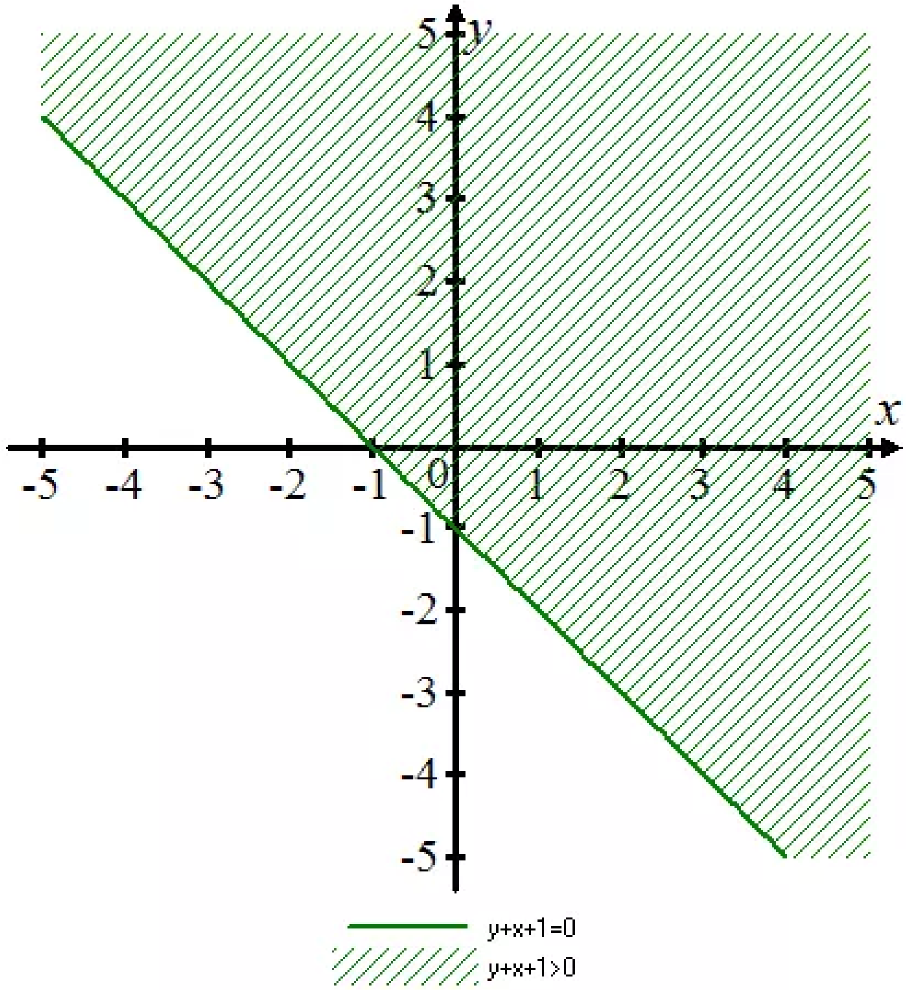


Put $(0,0)$ in the second inequality, we get

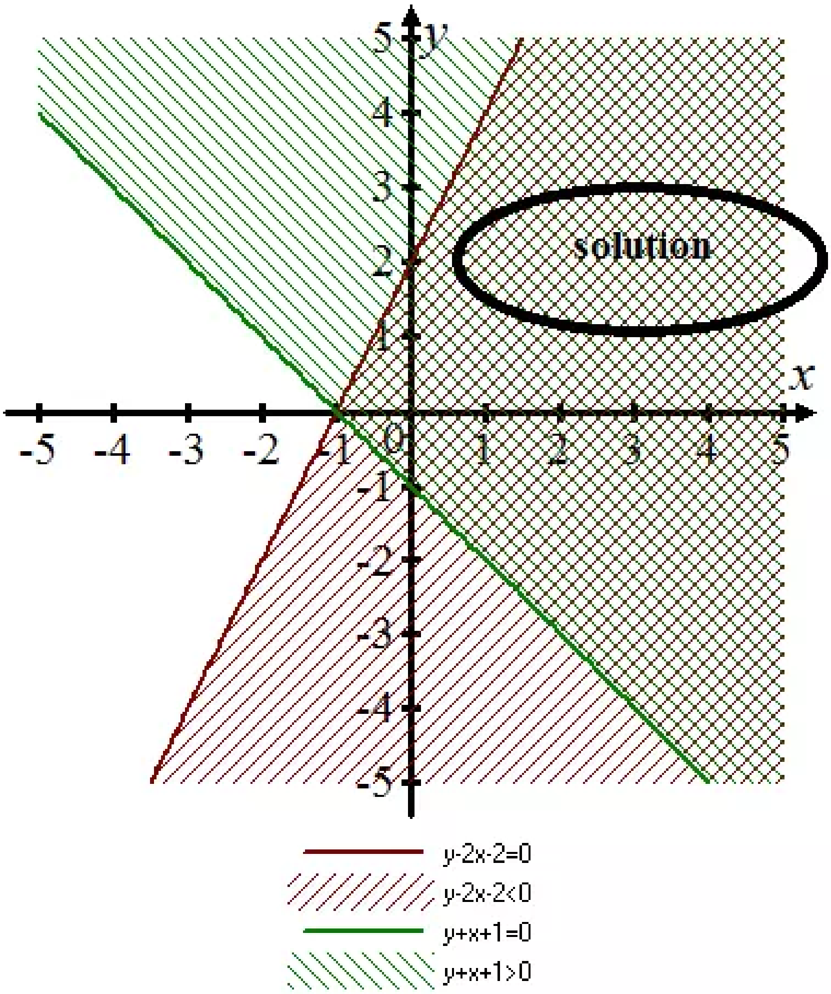
$$0 \geq -0-1$$

$$0 \geq -1, \text{true}$$

Therefore, the solution of the inequality $y \geq -x-1$ lies on the half-plane towards the origin.



Therefore, the combined solution of the given system of inequalities is the intersection of the solutions shown above.



Answer 62MYS.

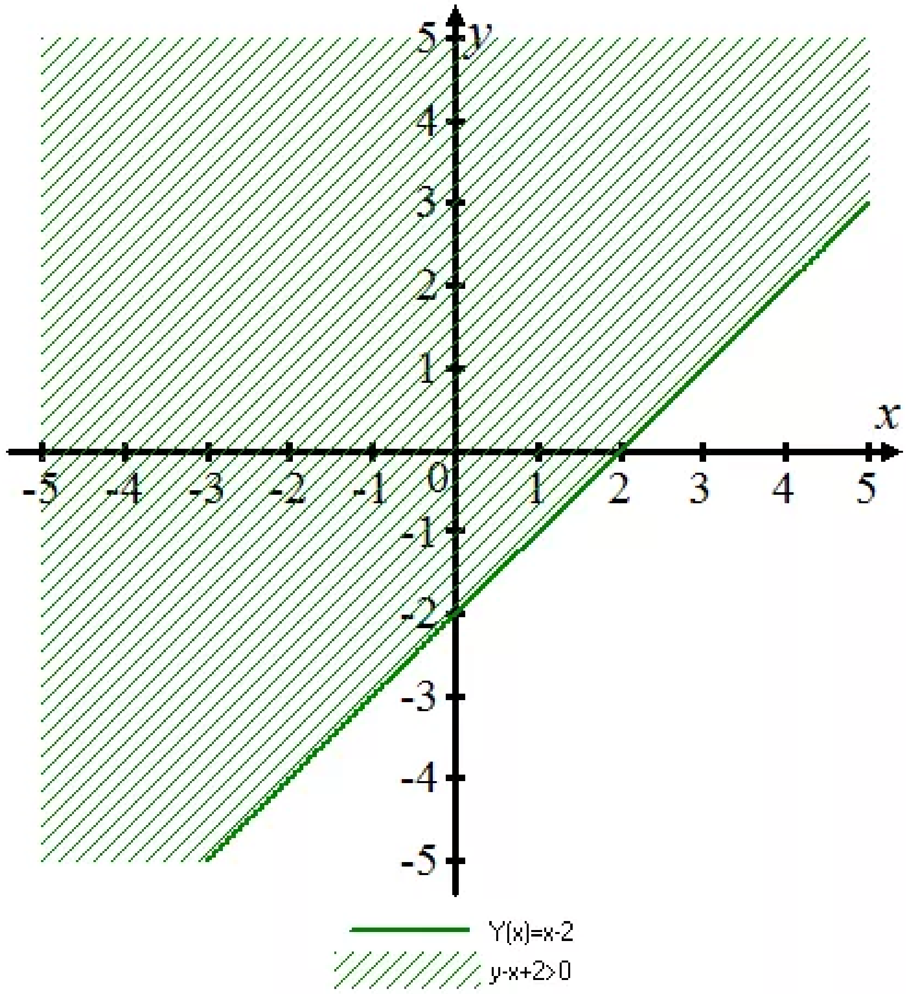
Consider the system of inequalities:

$$y \geq x - 2$$
$$y < 2x - 1$$

Put $(0,0)$ in the first inequality, we get

$$0 \geq 0 - 2$$
$$0 \geq -2, \text{true}$$

Therefore, the solution of the inequality $y \geq x - 2$ lies on the half-plane towards the origin.

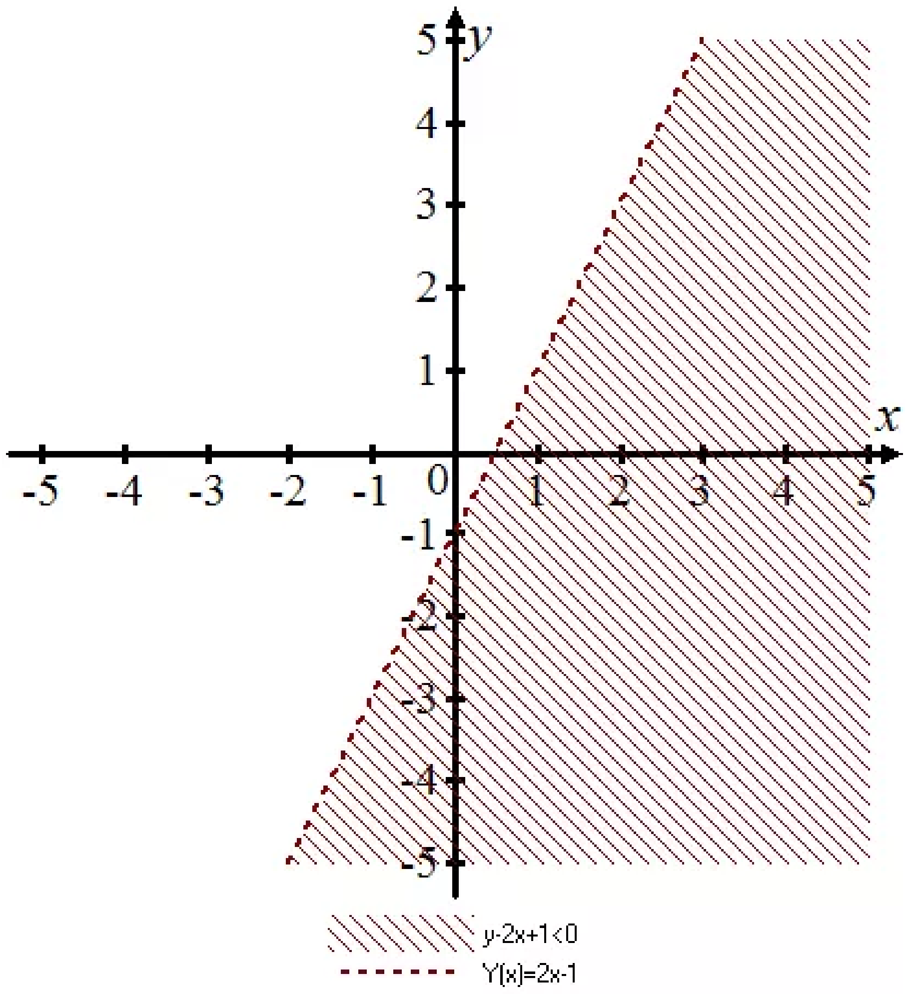


Put $(0,0)$ in the second inequality, we get

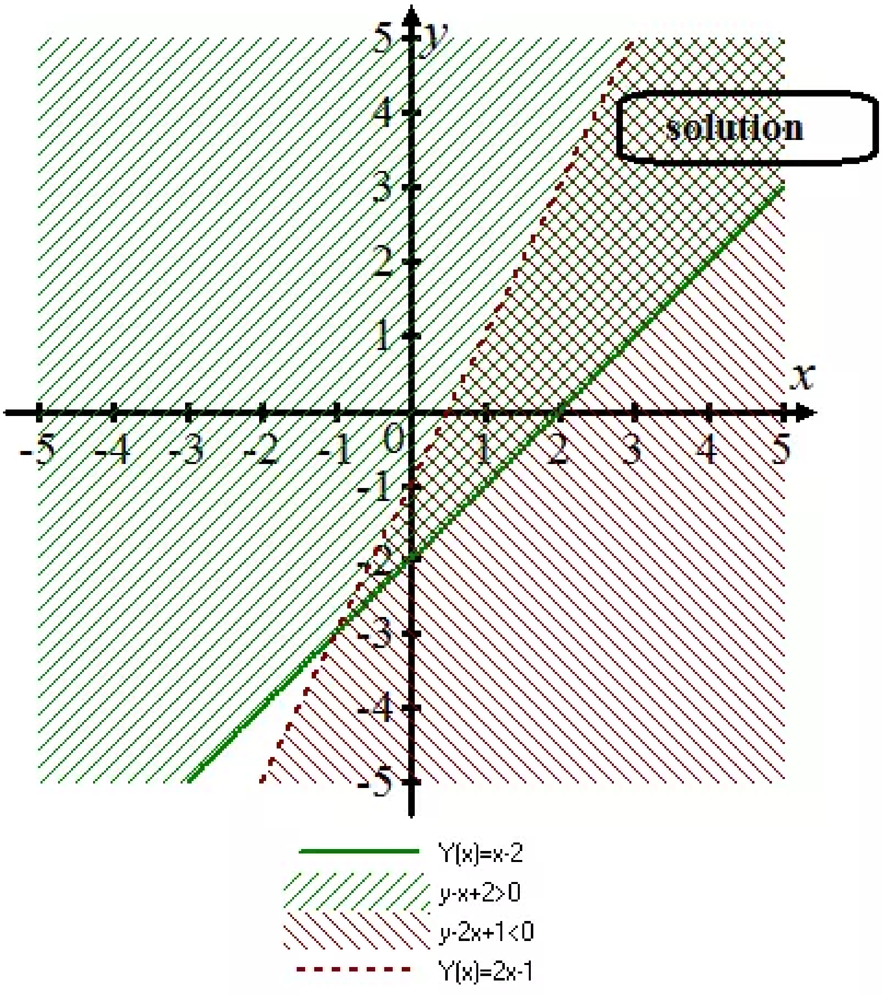
$$0 < 2(0) - 1$$

$$0 < -1, \text{not true}$$

Therefore, the solution of the inequality $y < 2x - 1$ does not lie on the half-plane towards the origin.



Therefore, the combined solution of the given system of inequalities is the intersection of the solutions shown above.



Answer 63MYS.

Consider the system of inequalities:

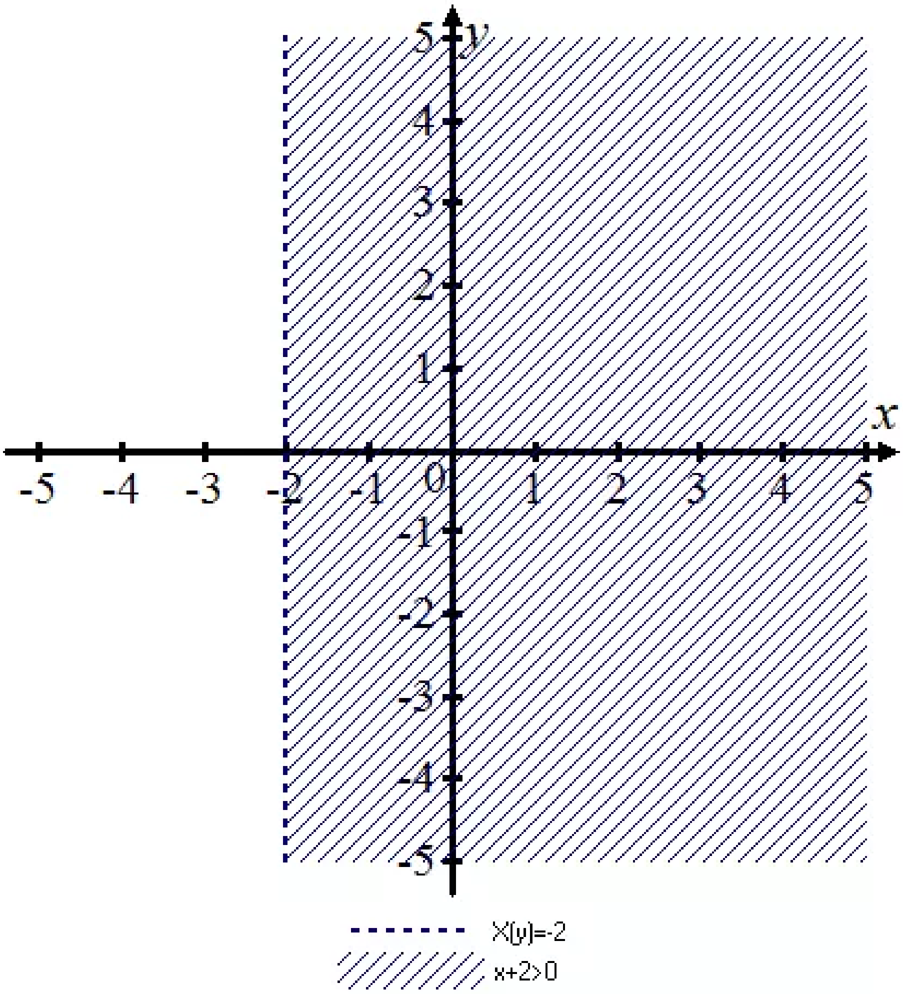
$x > -2$

$y < x + 3$

Put $(0,0)$ in the first inequality, we get

$0 > -2$, true

Therefore, the solution of the inequality $x > -2$ lies on the half-plane towards the origin.

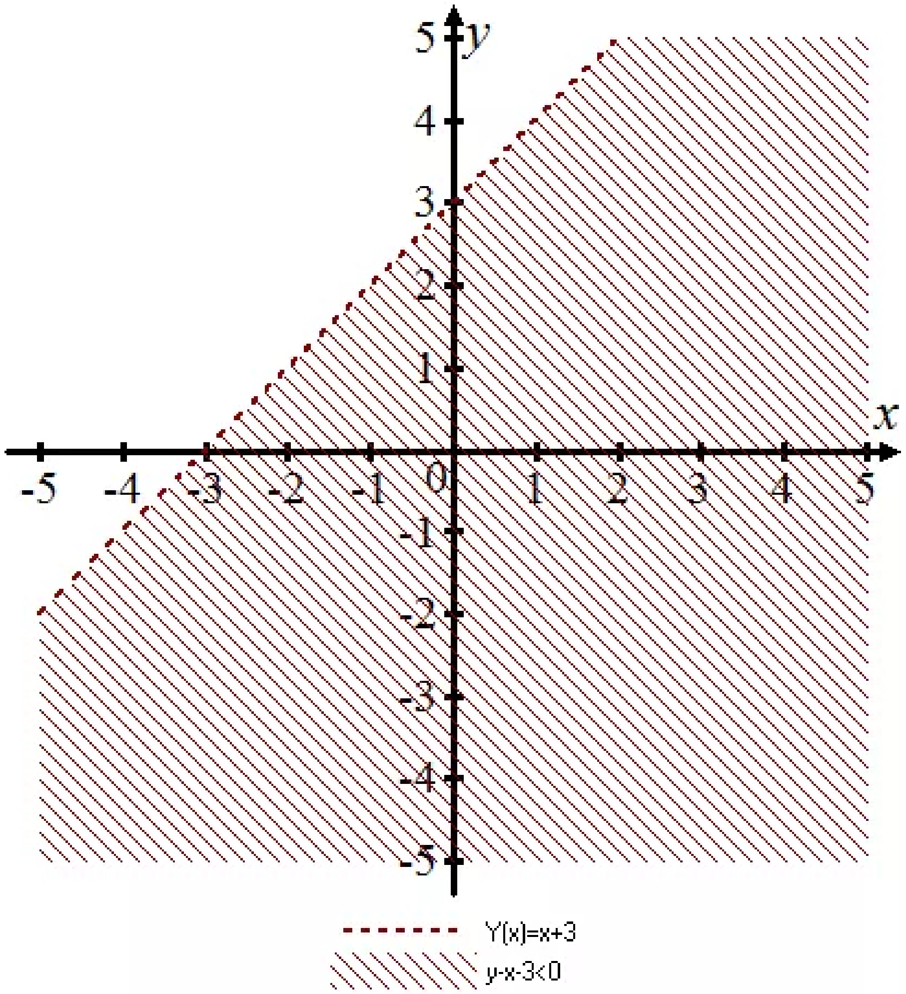


Put $(0,0)$ in the second inequality, we get

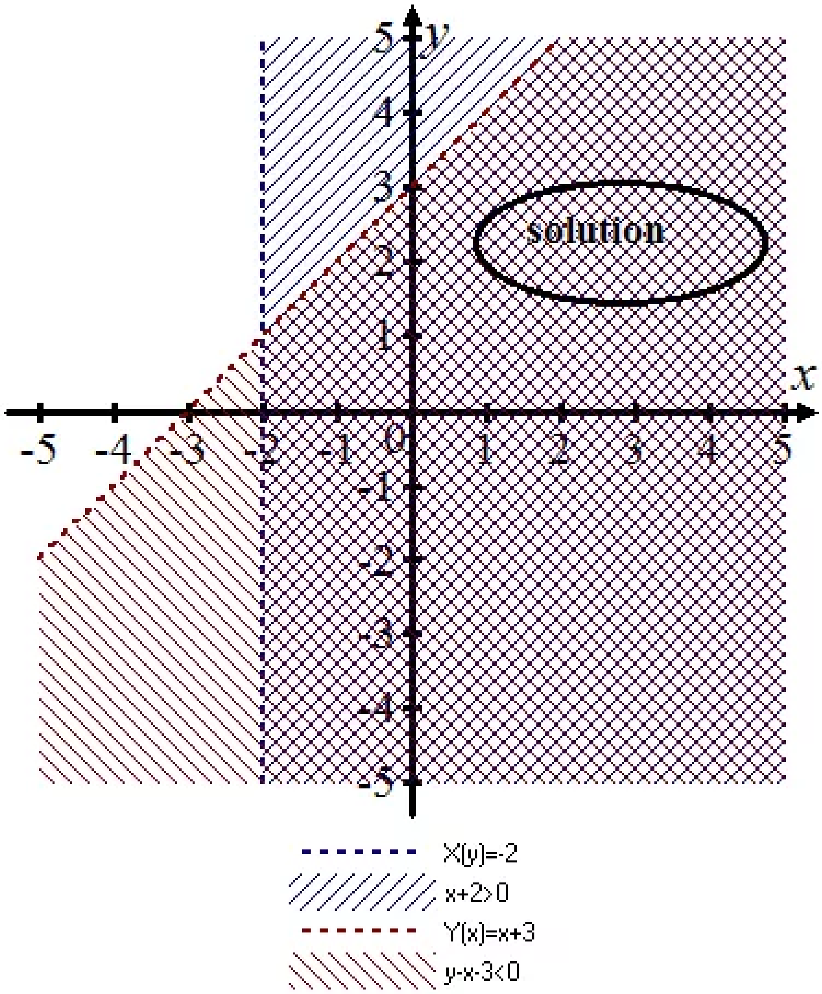
$0 < 0 + 3$

$0 < 3, \text{true}$

Therefore, the solution of the inequality, $y < x + 3$ lie on the half-plane towards the origin.



Therefore, the combined solution of the given system of inequalities is the intersection of the solutions shown above.



Answer 64MYS.

Consider the system of inequalities:

$$-4x+5y=2 \quad ...(1)$$
$$x+2y=6 \quad ...(2)$$

Multiply (2) by 4, we get

$$-4x+5y=2 \quad ...(1)$$
$$4x+8y=24 \quad ...(3)$$

Add (1) and (3):

$$13y=26$$
$$y=2$$

Put the value of y in (2), we get

$$x+2(2)=6$$
$$x=6-4$$
$$x=2$$

Therefore, the solution of the given system of equations is,

$$(2,2)$$

Check:

Put $x=2, y=2$ in the equations (1) and (2).

$$-4(2)+5(2)=2$$
$$2=2$$

This is true.

Also,

$$2+2(2)=6$$
$$6=6$$

This is true.

Hence, the solution of the given system of equations is $\boxed{(2,2)}$

Answer 65MYS.

Consider the system of inequalities:

$$3x+4y=-25 \qquad ...(1)$$
$$2x-3y=6 \qquad ...(2)$$

Multiply (1) by 2 and (2) by 3 we get,

$$6x+8y=-50 \qquad ...(3)$$
$$6x-9y=18 \qquad ...(4)$$

Subtract (4) from (3):

$$17y=-68$$
$$y=-4$$

Put the value of y in (2), we get

$$2x-3(-4)=6$$
$$2x+12=6$$
$$2x=-6$$
$$x=-3$$

Therefore, the solution of the given system of equations is,

$$(-3,-4)$$

Check:

Put $x=-3, y=-4$ in the equations (1) and (2).

$$3(-3)+4(-4)=-25$$
$$-9-16=-25$$
$$-25=-25$$

This is true.

Also,

$$2(-3)-3(-4)=6$$
$$-6+12=6$$
$$6=6$$

This is true.

Hence, the solution of the given system of equations is $\boxed{(-3,-4)}$

Answer 66MYS.

Consider the system of inequalities:

$$x + y = 20 \quad ...(1)$$
$$0.4x + 0.15y = 4 \quad ...(2)$$

Multiply (1) by 0.4 we get,

$$0.4x + 0.4y = 8 \quad ...(3)$$
$$0.4x + 0.15y = 4 \quad ...(2)$$

Subtract (2) from (3):

$$0.25y = 4$$
$$y = \frac{4}{0.25}$$
$$y = \frac{4}{\frac{25}{100}}$$
$$y = 16$$

Put the value of *y* in (1), we get

$$x + 16 = 20$$
$$x = 4$$

Therefore, the solution of the given system of equations is $\boxed{(4,16)}$.

Check:

Put $x = 4, y = 16$ in the equations (1) and (2).

$$4 + 16 = 20$$
$$20 = 20 \quad \text{true.}$$

This is true.

Also,

$$0.4(4) + 0.15(16) \overset{?}{=} 4$$
$$1.5 + 2.5 \overset{?}{=} 4$$
$$4 = 4 \quad \text{true.}$$

This is true.

Hence, the given system of equations has one solution.

Answer 67MYS.

Consider the following inequality:

$4+h\le -3$ (Or) $4+h\ge 5$

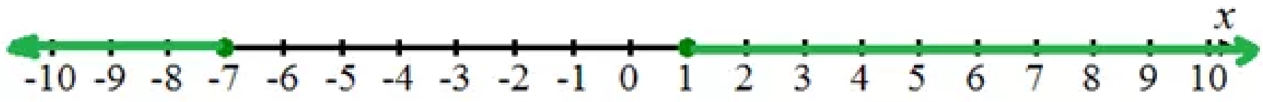
Now,

$$4+h\le -3$$
$$h\le -3-4$$
$$h\le -7 \qquad ...(1)$$

And,

$$4+h\ge 5$$
$$h\ge 1 \qquad ...(2)$$

By (1) and (2), we observe that the solution of the given inequalities is the set of real numbers which are less than or equal to -7 (or) greater than or equal to 1.



The solution set is $\boxed{\{h : h\le -7 (\text{or}) h\ge 1\}}$

Answer 68MYS.

Consider the following inequality:

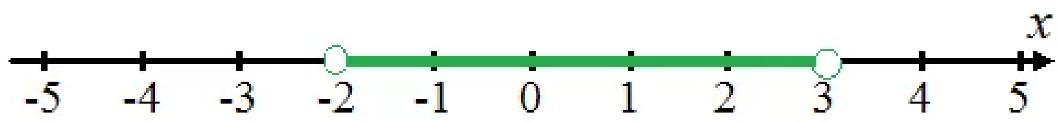
$4<4a+12<24$

$4-12<4a+12-12<24-12$ Add -12 on both sides

$-8<4a<12$ Simplify

$-2<a<3$ Divide both sides by 4

Therefore, the solution of the given inequality is the set of real numbers between -2 and 3.



The solution set is $\boxed{\{a : -2<a<3\}}$

Answer 69MYS.

Consider the following inequality:

$14 < 3h + 2 < 2$

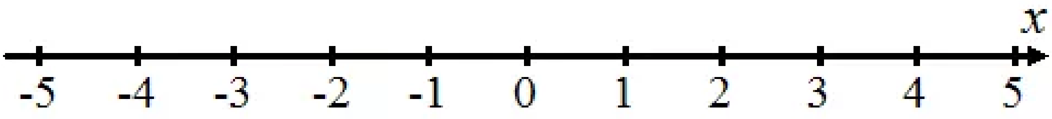
$14 - 2 < 3h + 2 - 2 < 2 - 2$ Add -2 on both sides

$12 < 3h < 0$ Simplify

$4 < h < 0$ Divide both sides by 3

This is not true.

Therefore, the solution of the given inequality is the set of real numbers between -2 and 3.does not exists. Hence the solution set is empty.



The solution set is $\boxed{\phi}$

Answer 70MYS.

Consider the following inequality:

$2m - 3 > 7$ (Or) $2m + 7 > 9$

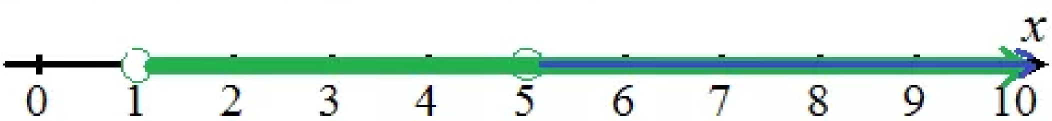
Now,

$$2m - 3 > 7$$
$$2m > 7 + 3$$
$$2m > 10$$
$$m > 5 \quad \ldots(1)$$

And,

$$2m + 7 > 9$$
$$2m + 7 - 7 > 9 - 7$$
$$2m > 2$$
$$m > 1 \quad \ldots(2)$$

By (1) and (2), we observe that the solution of the given inequalities is the set of real numbers which are greater than 5 (or) greater than 1.



The solution set is $\boxed{\{m : m > 5(\text{or})\, m > 1\}}$

Answer 71MYS.

Reflection:

It is a flip, and it is an opposite symmetry. That is, the image does not change size.

Translation:

In this transformation, the original object and its translation object have the same size and shape.

Dilation:

In this transformation, the original object and its image have the same shape and have the different size.

Rotation:

In this transformation, the object is rotated through an angle about a fixed point.

In the given figure, the original object and its image have the same shape and have the different size.

So, the transformation in the given figure is $\boxed{\text{dilation}}$.

Answer 72MYS.

Reflection:

It is a flip, and it is an opposite symmetry. That is, the image does not change size.

Translation:

In this transformation, the original object and its translation object have the same size and shape.

Dilation:

In this transformation, the original object and its image have the same shape and have the different size.

Rotation:

In this transformation, the object is rotated through an angle about a fixed point.

In the given figure, the original object and its translation object have the same size and shape.

So, the transformation in the given figure is $\boxed{\text{translation}}$.

Answer 73MYS.

Reflection:

It is a flip, and it is an opposite symmetry. That is, the image does not change size.

Translation:

In this transformation, the original object and its translation object have the same size and shape.

Dilation:

In this transformation, the original object and its image have the same shape and have the different size.

Rotation:

In this transformation, the object is rotated through an angle about a fixed point.

In the given figure, the original object and the image do not change size and the object and the image have the opposite symmetry.

So, the transformation in the given figure is $\boxed{\text{reflection}}$.

Answer 74MYS.

Given that two trains leave York at the same time.

One train is travelling towards north at 40 miles per hour.

And, other is travelling towards south at 30 miles per hour.

Therefore two trains are travelling 70 miles in 2 hours in opposite directions.

Let n be the number of hours that the two trains will apart 245 miles.

Then, by cross products, we have

$$\frac{2}{n} = \frac{70\,\text{miles}}{245\,\text{miles}}$$

$$\frac{2}{n} \times \frac{70}{245}$$

$$2 \cdot 245 = 70 \cdot n$$

$$\frac{490}{70} = n$$

$$n = 7$$

Therefore, the number hours will the trains be 245 miles apart is $\boxed{7}$

Answer 75MYS.

Consider the following expression:

$$\frac{2}{6}$$

Simplify this expression as follows.

$$\frac{2}{6} = \frac{\cancel{2}^{1}}{\cancel{6}_{3}} \quad \text{Divide by 2}$$

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

Therefore, the simplified form of the expression $\frac{2}{6}$ is $\boxed{\frac{1}{3}}$.

Answer 76MYS.

Consider the following expression:

$$\frac{3}{15}$$

Simplify this expression as follows.

$$\frac{3}{15} = \frac{\cancel{3}^{1}}{\cancel{15}_{5}} \quad \text{Divide by 3}$$

$$= \frac{1}{5}$$

Therefore, the simplified form of the expression $\frac{3}{15}$ is $\boxed{\frac{1}{5}}$.

Answer 77MYS.

Consider the following expression:

$$\frac{10}{5}$$

Simplify this expression as follows.

$$\frac{10}{5} = \frac{\cancel{10}^{2}}{\cancel{5}_{1}} \quad \text{Divide by 5}$$

$$= 2$$

Therefore, the simplified form of the expression $\frac{10}{5}$ is $\boxed{2}$.

Answer 78MYS.

Consider the following expression:

$$\frac{27}{9}$$

Simplify this expression as follows.

$$\frac{27}{9} = \frac{\cancel{27}^{3}}{\cancel{9}_{1}} \quad \text{Divide by 9}$$

$$= 3$$

Therefore, the simplified form of the expression $\frac{27}{9}$ is $\boxed{3}$.

Answer 79MYS.

Consider the following expression:

$$\frac{14}{36}$$

Simplify this expression as follows.

$$\frac{14}{36} = \frac{\cancel{14}^{7}}{\cancel{36}_{18}} \quad \text{Divide by 2}$$

$$= \frac{7}{18}$$

Therefore, the simplified form of the expression $\frac{14}{36}$ is $\boxed{\frac{7}{18}}$.

Answer 80MYS.

Consider the following expression:

$$\frac{9}{48}$$

Simplify this expression as follows.

$$\frac{9}{48} = \frac{\cancel{9}^{3}}{\cancel{48}_{16}} \quad \text{Divide by 3}$$

$$= \frac{3}{16}$$

Therefore, the simplified form of the expression $\frac{9}{48}$ is $\boxed{\frac{3}{16}}$.

Answer 81MYS.

Consider the following expression:

$$\frac{44}{32}$$

Simplify this expression as follows.

$$\frac{44}{32} = \frac{\cancel{44}^{11}}{\cancel{32}_{8}} \quad \text{Divide by 4}$$

$$= \frac{11}{8}$$

Therefore, the simplified form of the expression $\frac{44}{32}$ is $\boxed{\frac{11}{8}}$.

Answer 82MYS.

Consider the following expression:

$$\frac{45}{18}$$

Simplify this expression as follows.

$$\frac{45}{18} = \frac{\cancel{45}^{5}}{\cancel{18}_{2}} \quad \text{Divide by 9}$$

$$= \frac{5}{2}$$

Therefore, the simplified form of the expression $\frac{45}{18}$ is $\boxed{\frac{5}{2}}$.