Chapter 9. Factoring

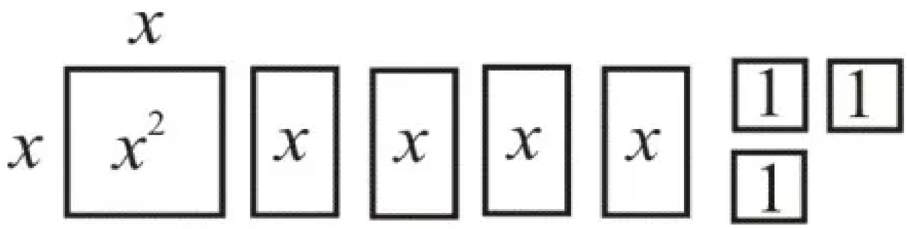
Ex. 9.2

Answer 1AA.

Consider the trinomial x^2+4x+3

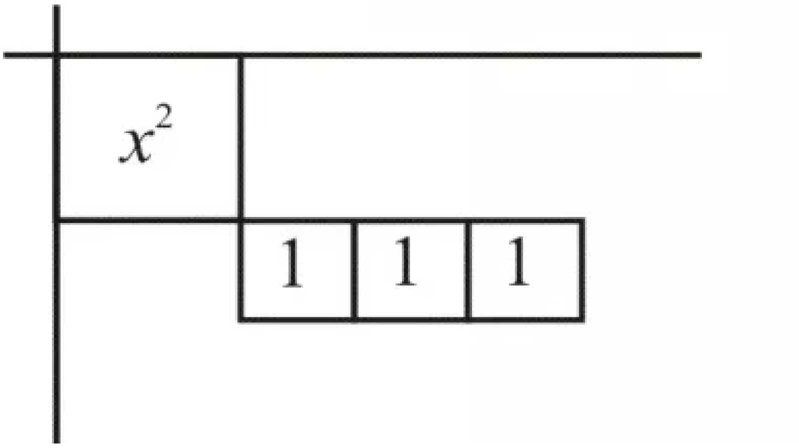
The objective is to factor x^2+4x+3 using algebraic tiles.

Model of the polynomial is

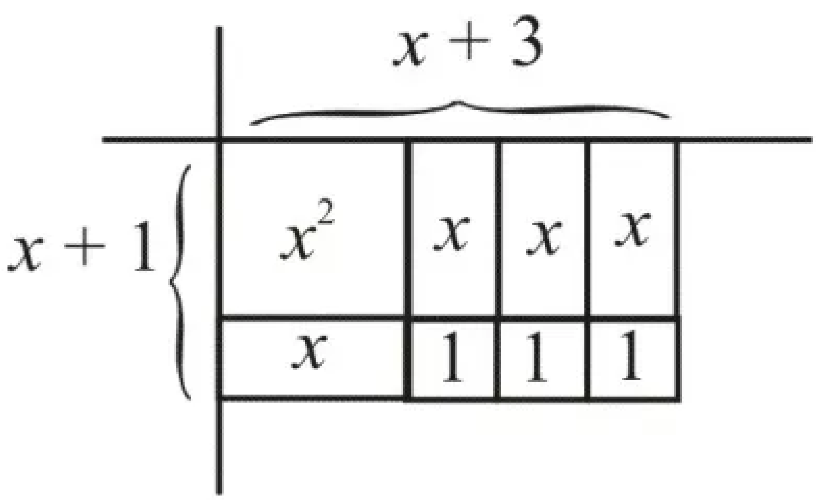


Place x^2 tile at the corner product mat.

Arrange the 1 tiles into a 1-by-3 rectangular array as shown



Place the *x* tails as fallows



Thus the rectangular has width of $x+1$ and length of $x+3$

Thus $x^2+4x+3=(x+1)(x+3)$

Therefore, the factorization of given trinomial is $\boxed{(x+1)(x+3)}$

Answer 1CU.

Consider the polynomial $4x^2 + 12x$

The objective is to write the given polynomial as product of factors in three different ways.

Since

$$
\begin{aligned}
4x^2 &= 4 \cdot x^2 \\
&= 2 \cdot 2 \cdot x \cdot x \qquad \left[4 = 2 \cdot 2, x^2 = x \cdot x\right] \\
12x &= 2 \cdot 6 \cdot x \qquad [12 = 6 \cdot 2] \\
&= 2 \cdot 2 \cdot 3 \cdot x
\end{aligned}
$$

$$
\begin{aligned}
4x^2 + 12x &= 2 \cdot 2 \cdot x \cdot x + 2 \cdot 6 \cdot x \\
&= 2 \cdot 2x^2 + 2,6x \\
&= 2\left(2x^2 + 6x\right) \qquad \left[\text{Since } a(b+c) = ab + ac\right]
\end{aligned}
$$

$$
\begin{aligned}
4x^2 + 12x &= 2 \cdot 2 \cdot x \cdot x + 2 \cdot 2 \cdot 3 \cdot x \\
&= 4 \cdot x^2 + 4 \cdot 3x \\
&= 4\left(x^2 + 3x\right) \qquad \left[\text{Since } a(b+c) = ab + ac\right]
\end{aligned}
$$

$$
\begin{aligned}
4x^2 + 12x &= 2 \cdot 2 \cdot x \cdot x + 2 \cdot 2 \cdot 3 \cdot x \\
&= 4x \cdot x + 4x \cdot 3 \\
&= 4x(x+3) \qquad \left[\text{Since } a(a+c) = ab + ac\right]
\end{aligned}
$$

$4x^2 + 12x$ can be written as $2\left(2x^2 + 6x\right), 4\left(x^2 + 3x\right), 4x(x+3)$ is factored completely,

Since

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$4x^2 = 2 \cdot 2 \cdot x \cdot x$

$12x = 2 \cdot 2 \cdot 3 \cdot x$

GCF $= 2 \cdot 2 \cdot x$

$= 4x$

$4x^2 + 12x = 4x(x+3)$ is factored completely

Since GCF of $4x^2, 12x$ is $4x$

Answer 1PQ.

Consider the number 225

The objective is to find the factors of 225 and classify whether it is prime or composite.

For this first list all pairs of whole numbers whose product is 225.

Those are

$$1 \times 225 = 225$$
$$3 \times 75 = 225$$
$$5 \times 45 = 225$$
$$9 \times 25 = 225$$
$$15 \times 15 = 225$$

The factors are the whole numbers whose product is 225.

The factors are $1,3,5,9,15,25,45,75$ and 225

A whole number greater than 1, which has more than two factors, is called a composite number.

Since 225 has 9 factors

225 is a composite number.

Therefore, the factors of 225 are $1,3,5,9,15,25,45,75$ and 225.

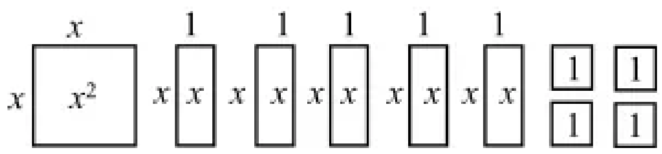
$\boxed{225}$ is a composite number.

Answer 2AA.

Consider the trinomial x^2+5x+4

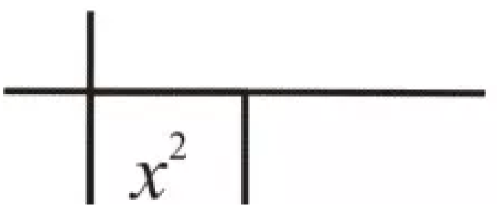
The objective is to factor x^2+5x+4 using algebraic tiles.

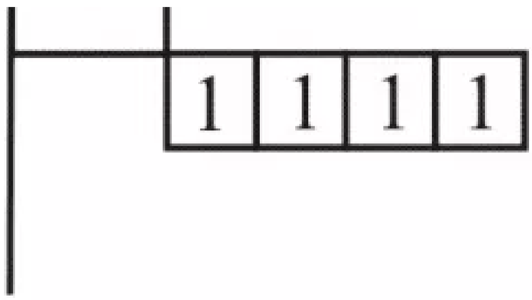
Model of trinomial is



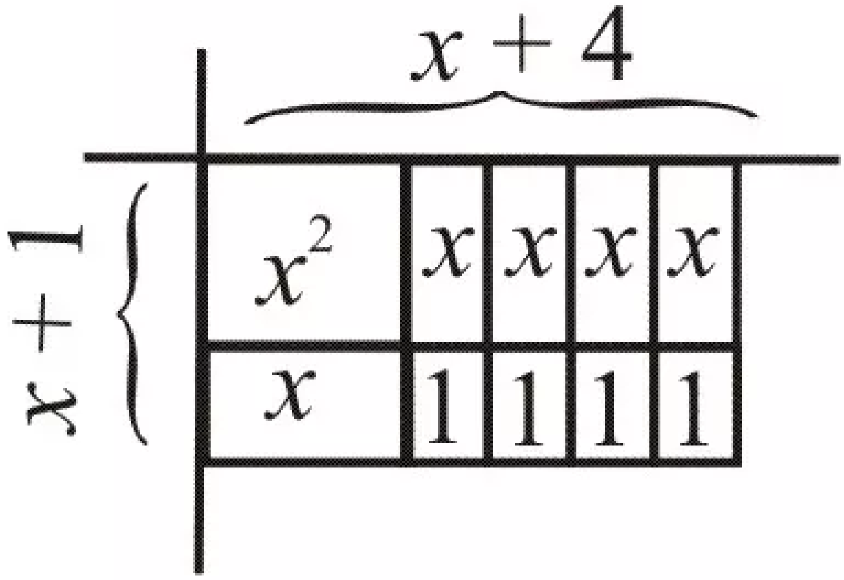
Place x^2 tiles at the corner of the product mat,

Arrange the 1 tiles in to a 1-by-4 rectangular array as shown.





Place the *x* tiles as follows



Thus the rectangular has width of $x+1$ and length of $x+4$

Thus, $x^2+5x+4=(x+1)(x+4)$

Therefore, the factorization of given trinomial is $\boxed{(x+1)(x+4)}$

Answer 2CU.

The zero product property is " If $ab=0$ then $a=0$ or $b=0$ or both".

Consider the equation $ab=0$

Then $x=0$ or $x+2=0$ (by zero product property)

Now solve each equation individually

$x=0,$

$$x+2=0$$
$$x+2-2=0-2 \qquad [\text{Subtract 2 on both side}]$$
$$x=-2$$

The solution set is $\{0,-2\}$

Answer 2PQ.

Consider the number -320

The objective is to express -320 in prime factorization form.

For this use the factor method.

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\begin{array}{lll}
-320 = -1\cdot 320 & & \\
 & 2\cdot 160 & [2\cdot 16 = 320] \\
 & 2\cdot 80 & [2\cdot 80 = 160] \\
 & 2\cdot 40 & [2\cdot 40 = 80]
\end{array}
$$

$\wedge$

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$$
\begin{array}{ll}
2\cdot 20 & [2\cdot 20 = 40] \\
2\cdot 10 & [2\cdot 10 = 20] \\
2\cdot 5 & [2\cdot 5 = 10]
\end{array}
$$

All the factors in last branches of the factor tree are primes.

The prime factorization of -320 is $-1\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2\cdot 5$

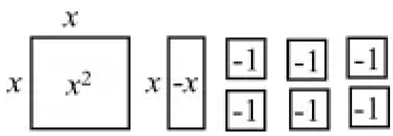
Therefore, the prime factorization of -320 $\boxed{-1\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2\cdot 5}$

Answer 3AA.

Consider the trinomial $x^2 - x - 6$

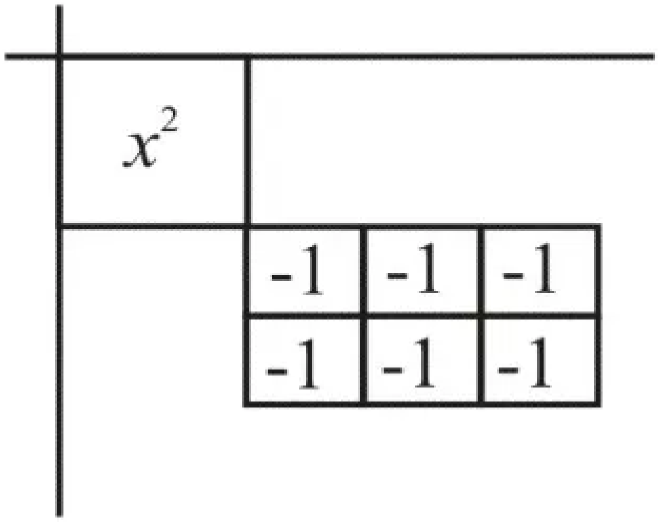
The objective is to factor $x^2 - x - 6$ using algebraic tiles.

Model of trinomial is

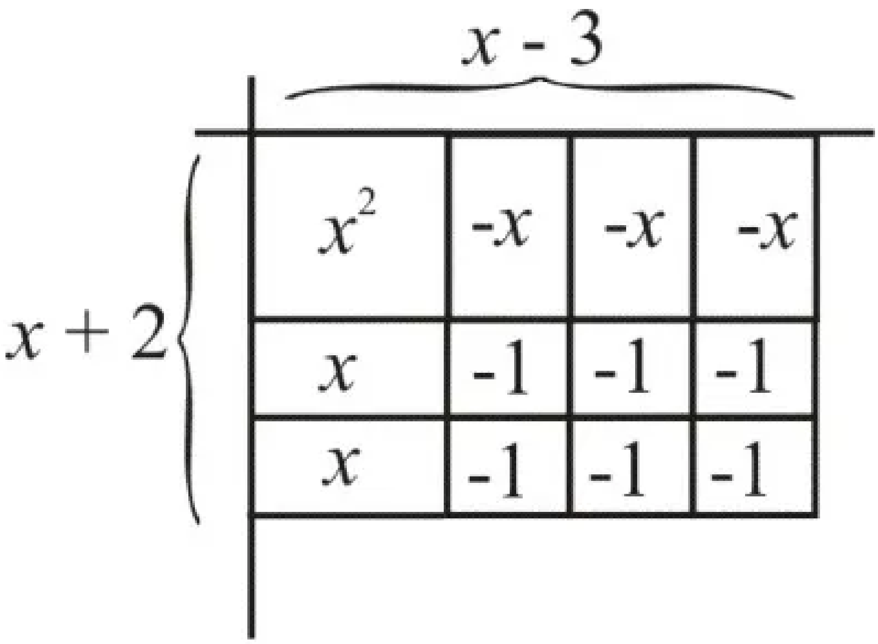


Place x^2 tiles at the corner of the product mat,

Arrange the -1 tiles in to a 2-by-3 rectangular array as shown.



Place the -*x* tile and add zero pairs without changing the polynomial. Here add two zero pairs of *x* tiles.



Thus the rectangular has width of $x+2$ and length of $x-3$

Thus, $x^2 - x - 6 = (x+3)(x-3)$

Therefore, the factorization of given trinomial is $\boxed{(x+3)(x-3)}$

Answer 3CU.

Consider the equation $(x-2)(x+4)=0$

It cannot be solved by dividing $x-2$ on each side

Since if it is divided by $x-2$, then $x-2$ is eliminated from the equation.

And the solution of $x-2=0$ is $x=2$ is eliminated.

$(x-2)(x+4)=0$ cannot be solved by dividing each side by $x-2$

The division would eliminate 2 as a solution

Answer 9PQ.

Consider the polynomial $78a^2bc^3$

The objective is to factor the given expression completely

$$\begin{aligned} 78a^2bc^3 &= 2\cdot 39\cdot a^2bc^3 && [78=2\cdot 39] \\ &= 2\cdot 3\cdot 13a^2bc^3 && [39=3\cdot 13] \\ &= 2\cdot 3\cdot 13\cdot a\cdot a\cdot abc^3 && [a^2=a\cdot a] \\ &= 2\cdot 3\cdot 13\cdot a\cdot a\cdot b\cdot c\cdot c\cdot c && [c^3=c\cdot c\cdot c] \end{aligned}$$

Thus, $78a^2bc^3 = 2\cdot 3\cdot 13\cdot a\cdot a\cdot b\cdot c\cdot c\cdot c$ factored completely

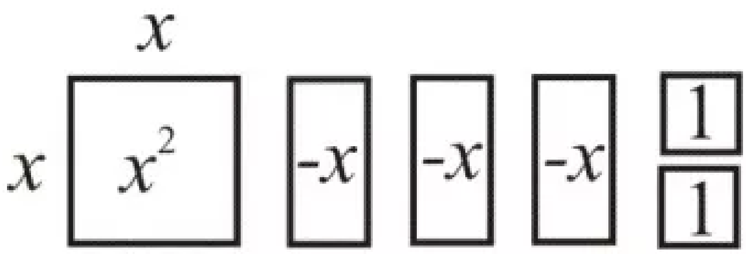
Therefore, $78a^2bc^3$ in factorized form is $\boxed{2\cdot 3\cdot 13\cdot a\cdot a\cdot b\cdot c\cdot c\cdot c}$

Answer 4AA.

Consider the trinomial x^2-3x+2

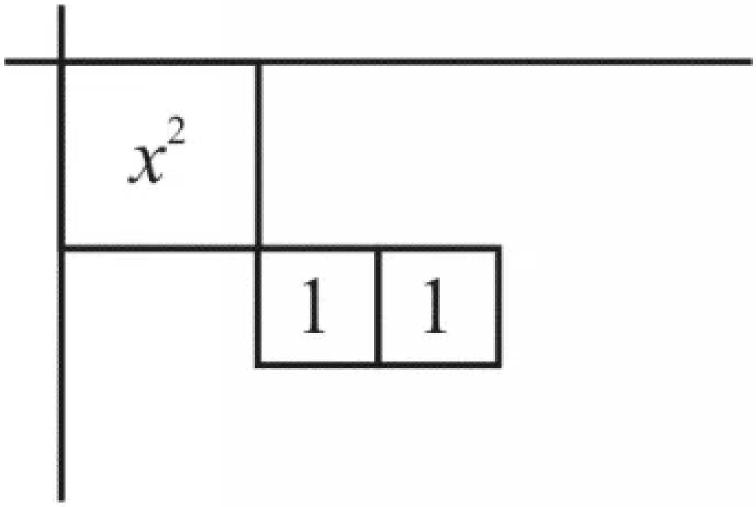
The objective is to factor x^2-3x+2 using algebraic tiles.

Model of trinomial is

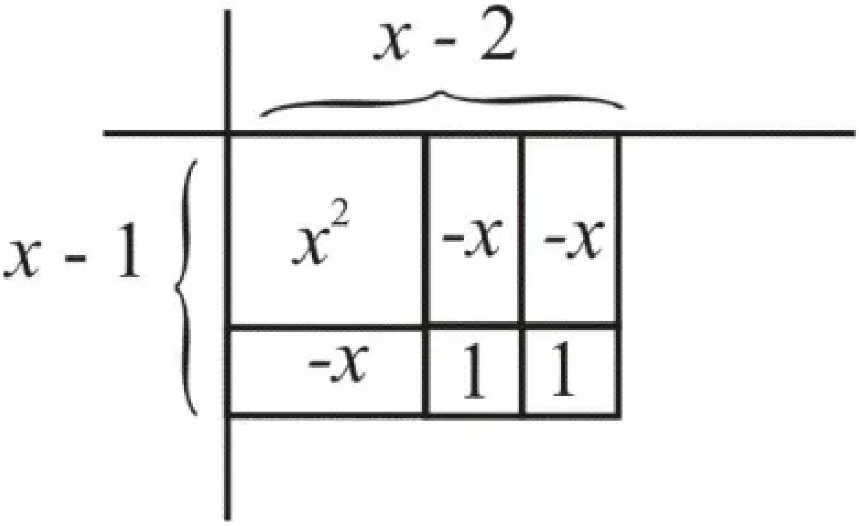


Place x^2 tiles at the corner of the product mat,

Arrange the 1 tiles in to a 1-by-2 rectangular array as shown.



Place the -*x* tile as follows



Thus the rectangular has width of $x-1$ and length of $x-2$

Thus, $x^2-3x+2=(x-1)(x-2)$

Therefore, the factorization of given trinomial is $\boxed{(x-1)(x-2)}$

Answer 4CU.

Consider the polynomial $9x^2 + 36x$

The objective, is to factor the given polynomial

For this, we find the GCF of $9x^2$ and 36*x*.

$$9x^2 = 3 \cdot 3 \cdot x \cdot x \qquad \left[9 = 3 \cdot 3, x^2 = x \cdot x\right]$$

$$36x = 2 \cdot 2 \cdot 9 \cdot x \qquad [36 = 2 \cdot 2 \cdot 9]$$

$$= 2 \cdot 2 \cdot 3 \cdot 3 \cdot x \qquad [9 = 3 \cdot 3]$$

GCF = The product of the prime factors common to each prime factorization.

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$$9x^2 = 3 \cdot 3 \cdot x \cdot x$$

$$36x = 2 \cdot 2 \cdot 3 \cdot 3 \cdot x$$

GCF = $3 \cdot 3 \cdot x = 9x$

$$9x^2 + 36x = 3 \cdot x \cdot x \cdot x + 2 \cdot 2 \cdot 3 \cdot 3 \cdot x \qquad \left[\begin{array}{l}\text{Write each as the product of GCF} \\ \text{and its remining factors}\end{array}\right]$$

$$= 9x(x+4) \qquad \left[\text{By distributive; } a(b+c) = ab + ac\right]$$

$$9x^3 + 36x = 9x(x+4)$$

Therefore, the complete factored form of $9x^2 + 36x$ is $\boxed{9x(x+4)}$

Answer 4PQ.

Given set of monomials are $54x^3, 42x^2y$ and $30xy^2$

The objective is to find the GCF of given set of monomials.

Since the GCF of two or more monomials is product of the prime factors common to each monomial.

For this first express each monomial in prime factorization form.

$$\begin{aligned} 54x^3 &= 2\cdot27x^3 && [54=2\cdot27] \\ &= 2\cdot3\cdot9x^3 && [27=3\cdot9] \\ &= 2\cdot3\cdot3\cdot3x^3 && [9=3\cdot3] \\ &= 2\cdot3\cdot3\cdot3\cdot x\cdot x\cdot x && \left[x^3 = x\cdot x\cdot x\right] \end{aligned}$$

$$\begin{aligned} 45x^2y &= 2\cdot21x^2y && [42=2\cdot21] \\ &= 2\cdot3\cdot7x^2y && [21=3\cdot7] \\ &= 2\cdot3\cdot7\cdot x\cdot x\cdot y && \left[x^2 = x\cdot x\right] \end{aligned}$$

$$\begin{aligned} 30xy^2 &= 2\cdot15xy^2 && [2\cdot15=30] \\ &= 2\cdot3\cdot5xy^2 && [3\cdot5=15] \\ &= 2\cdot3\cdot5\cdot x\cdot y\cdot y && \left[y^2 = y\cdot y\right] \end{aligned}$$

Circle the common prime factors

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$54x^3 = 2\cdot3\cdot3\cdot3\cdot x\cdot x\cdot x$

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$45x^2y = 2\cdot3\cdot7\cdot x\cdot x\cdot y$

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$30xy^2 = 2\cdot3\cdot5\cdot x\cdot y\cdot y$

The GCF = The product of prime factors common to each monomials

$= 2\cdot3\cdot x$

$= 6x$

The GCF of $54x^3, 42x^2y$ and xy^2 is $6x$

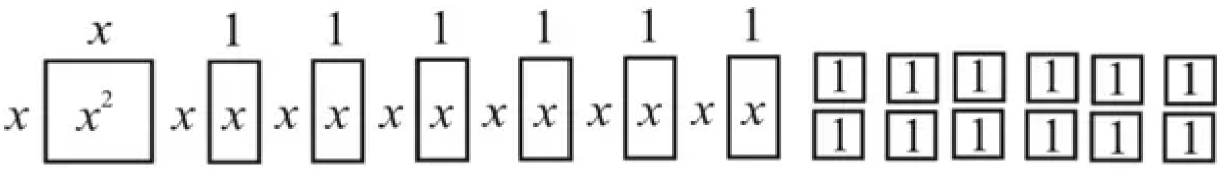
Therefore, the GCF of given set of monomials is $\boxed{6x}$

Answer 5AA.

Consider the trinomial $x^2+7x+12$

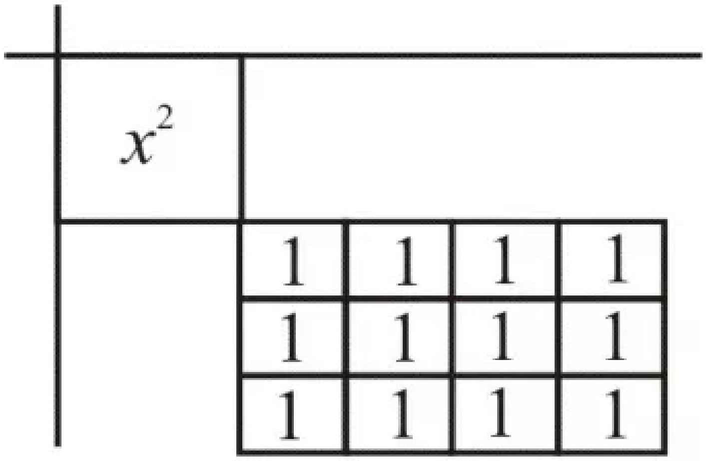
The objective is to factor $x^2+7x+12$ using algebraic tiles.

Model of trinomial is



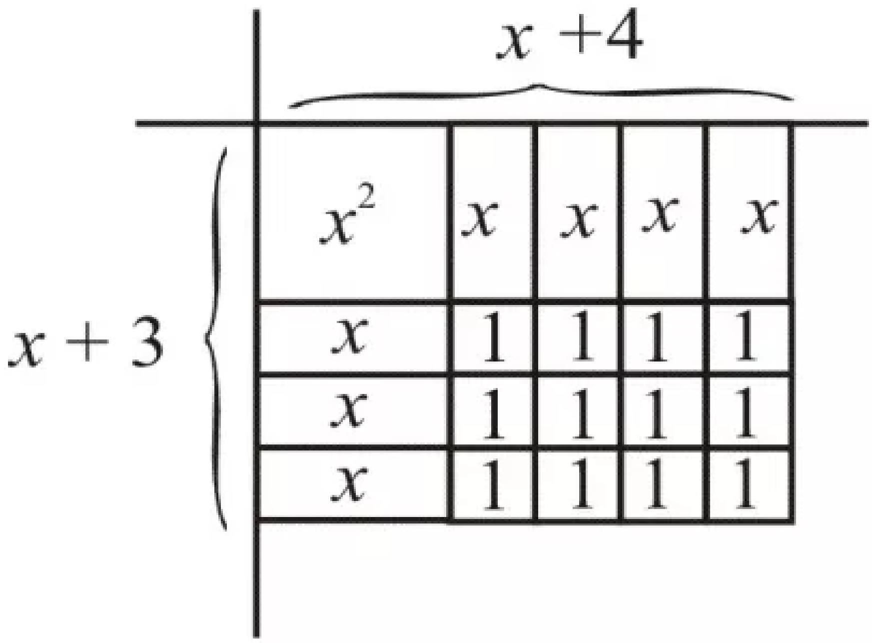
Place x^2 tiles at the corner of the product mat,

Arrange the 1 tiles in to a 3-by-4 rectangular array as shown.



Place the *x* tile as follows

Place the *x* tile as follows



Thus the rectangular has width of $x+3$ and length of $x+4$

Thus, $x^2+7x+12=(x+3)(x+4)$

Therefore, the factorization of given trinomial is $\boxed{(x+3)(x+4)}$

Answer 5CU.

Consider the polynomial $16xz - 40xz^2$

The objective, is to factor the given polynomial

For this, we find the GCF of $16xz$ and $-40xz^2$.

$$16xz = 4\cdot4\cdot x\cdot z \qquad [16 = 4\cdot4]$$
$$= 2\cdot2\cdot2\cdot2\cdot x\cdot z \qquad [4 = 1\cdot2]$$
$$-40xz^2 = -10\cdot4\cdot x\cdot z\cdot z \qquad [-40 = -10\cdot4, z^2 = z\cdot z]$$
$$= -5\cdot2\cdot2\cdot2\cdot x\cdot z\cdot z \qquad [-10 = -8\cdot2, 4 = 2\cdot2]$$

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GCF = The product of the prime factors common to each prime factorization.

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$$16xz = 2\cdot2\cdot2\cdot2\cdot x\cdot z$$
$$-40xz^2 = -5\cdot2\cdot2\cdot2\cdot x\cdot z\cdot z$$

GCF $= 2\cdot2\cdot2\cdot x\cdot z$

$= 8xy$

$$16xz - 40xz^2 = 2\cdot2\cdot2\cdot2\cdot x\cdot z - 5\cdot2\cdot2\cdot2\cdot x\cdot z\cdot z$$

$$\left[\begin{array}{l}\text{Write each as the product of GCF}\\ \text{and its remining factors}\end{array}\right]$$

$$= 8xz(2 - 5z) \qquad [\text{By distributive; } a(b+c) = ab + ac]$$

$$16xz - 40xz^2 = 8xz(2 - 5z)$$

Therefore, the complete factored form of $16xz - 40xz^2$ is $\boxed{8xz(2 - 5z)}$

Answer 5PQ.

Consider the polynomial $4xy^2 - xy$

The objective is to factor the given polynomial.

For this, first find the GCF of $4xy^2$ and $-xy$

$$4xy^2 = 2 \cdot 2 \cdot x \cdot y \cdot y \qquad \left[4 = 2 \cdot 2, y^2 = y \cdot y\right]$$

$$\begin{aligned} -xy &= -x \cdot y \\ &= -1 \cdot x \cdot y \qquad [-x = -1 \cdot x] \end{aligned}$$

GCF = the product of the prime factors common to each prime factorization

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$$4xy^2 = 2 \cdot 2 \cdot x \cdot y \cdot y$$

$$-xy = -1 \cdot x \cdot y$$

GCF = xy

$$\begin{aligned} 4xy^2 - xy &= 2 \cdot 2 \cdot x \cdot y \cdot y - 1 \cdot x \cdot y \qquad \left[\begin{array}{l}\text{write each as the product of GCF} \\ \text{and its remaining factors}\end{array}\right] \\ &= xy(4y-1) \qquad \left[\text{by distributive, } a(b+c) = ab + ac\right] \end{aligned}$$

$$4xy^2 - xy = xy(4y-1)$$

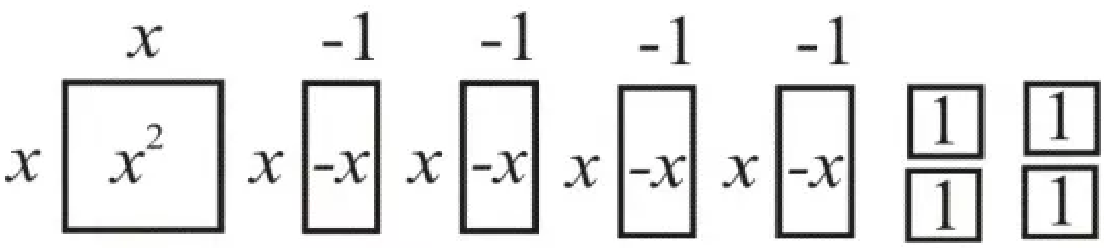
Therefore, the complete factored form of $4xy^2 - xy$ is $\boxed{xy(4y-1)}$

Answer 6AA.

Consider the trinomial x^2-4x+4

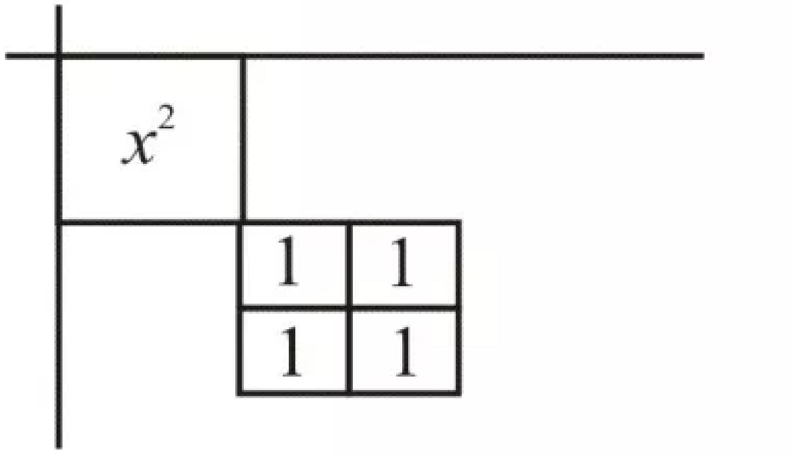
The objective is to factor the given trinomial using algebraic tiles

Model of trinomial is

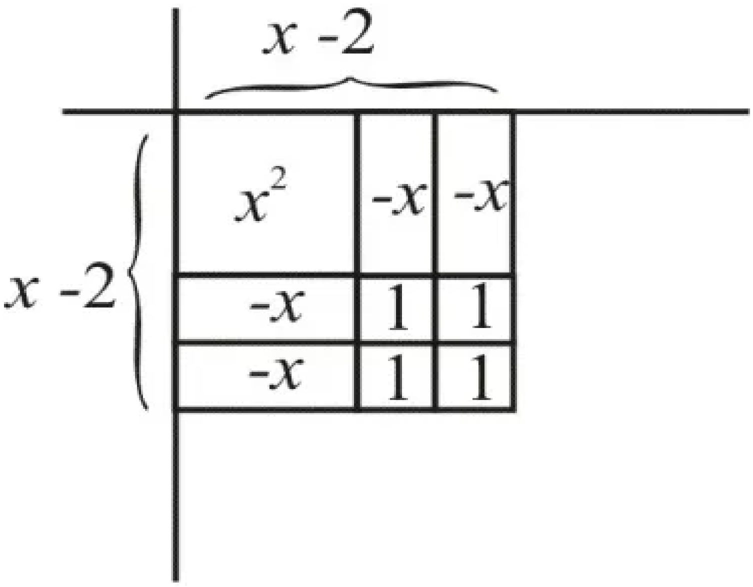


Place x^2 tiles at the corner of the product mat,

Arrange the 1 tile in to 2-by -2 rectangular array ass shown



Place the -*x* tile as follows



Thus the rectangular has width of $x-2$ and length of $x-2$

Thus,

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

Therefore, the factorization of given trinomial is $\boxed{(x-2)^2}$

Answer 6CU.

Consider the polynomial $24m^2np^2 + 36m^2n^2p$

The objective, is to factor the given polynomial

For this, we find the GCF of $24m^2np^2$ and $36m^2n^2p$

$$\begin{aligned} 24m^2np^2 &= 2\cdot12\cdot m\cdot m\cdot n\cdot p\cdot p && \left[24 = 2\cdot12, m^2 = m\cdot m, p^2 = p\cdot p\right] \\ &= 2\cdot2\cdot6\cdot m\cdot m\cdot n\cdot p\cdot p && [12 = 2\cdot6] \\ &= 2\cdot2\cdot2\cdot3\cdot m\cdot m\cdot n\cdot p\cdot p && [6 = 2\cdot3] \end{aligned}$$

$$\begin{aligned} 36m^2n^2p &= 4\cdot9\cdot m\cdot m\cdot n\cdot n\cdot p && [36 = 4\cdot9] \\ &= 2\cdot2\cdot3\cdot3\cdot m\cdot m\cdot n\cdot n\cdot p && [4 = 2\cdot2, 9 = 3\cdot3] \end{aligned}$$

GCF = The product of the prime factors common to each prime factorization.

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$$24m^2np^2 = 2\cdot2\cdot2\cdot3\cdot m\cdot m\cdot n\cdot p\cdot p$$
$$36m^2n^2p = 2\cdot2\cdot3\cdot3\cdot m\cdot m\cdot n\cdot n\cdot p$$

GCF $= 2\cdot2\cdot3\cdot m\cdot m\cdot n\cdot p$

$= 12m^2np$

$$24m^2np^2 + 36m^2n^2p = 2\cdot2\cdot2\cdot3\cdot m\cdot m\cdot n\cdot p\cdot p + 2\cdot2\cdot3\cdot3\cdot m\cdot m\cdot n\cdot n\cdot p$$

$\left[\text{Write each as the product of GCF and its remining factors}\right]$

$$= 12m^2np(2p + 3n) \quad \left[\text{By distributive; } a(b+c) = ab + ac\right]$$

$$24m^2np^2 + 36m^2n^2p = 12m^2np(2p + 3n)$$

Therefore, the complete factored form of $24m^2np^2 + 36m^2n^2p$ is $\boxed{12m^2np(2p + 3n)}$

Answer 9PQ.

Consider the polynomial $32a^2b+40b^3-8a^2b^2$

The objective is to factor the given polynomial.

For this, first find the GCF of $32a^a, 40b^3$ and $-8a^2b^2$

$$32a^2b = 8\cdot4\cdot a\cdot a\cdot b \qquad [32=8\cdot4, a^2=a\cdot a]$$

$$= 2\cdot2\cdot2\cdot2\cdot2\cdot2 \qquad [8=2\cdot2\cdot2, 4=2\cdot2]$$

$$40b^3 = 2\cdot20\cdot b\cdot b\cdot b \qquad [40=2\cdot20]$$

$$= 2\cdot2\cdot10\cdot b\cdot b\cdot b \qquad [20=2\cdot10]$$

$$= 2\cdot2\cdot2\cdot5\cdot b\cdot b\cdot b \qquad [10=2\cdot5]$$

$$-8a^2b^2 = -2\cdot2\cdot2\cdot a\cdot a\cdot b\cdot b \qquad [-8=-2\cdot2\cdot2, a^2=a\cdot a, b^2=b\cdot b]$$

Since GCF = The product of the common factors which are in all the factorizations

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$$32a^2b = 2\cdot2\cdot2\cdot2\cdot2\cdot a\cdot a\cdot b$$

$$40b^3 = 2\cdot2\cdot2\cdot5\cdot b\cdot b\cdot b$$

$$-8a^2b^2 = 2\cdot2\cdot2\cdot a\cdot a\cdot b\cdot b\cdot -1$$

The GCF $= 2\cdot2\cdot2\cdot b$

$= 8b$

$$32a^2b+40b^3-8a^2b^2$$

$$= 2\cdot2\cdot2\cdot2\cdot2\cdot a\cdot a\cdot b + 2\cdot2\cdot2\cdot5\cdot b\cdot b\cdot b - 2\cdot2\cdot2\cdot a\cdot a\cdot b\cdot b\cdot -1$$

[Write each as the product of GCF]

$$= 8b(4a^2)+8b(5b^2)+8b(-a^2b) \qquad \text{[Simplify]}$$

$$= 8b(4a^2+5b^2)+8b(-a^2b) \qquad [\text{Since } a(b+c)=ab+ac]$$

$$= 8b(4a^2+5b^2-a^2b) \qquad [\text{Since } a(b+c)=ab+ac \text{ Apply distributive property}]$$

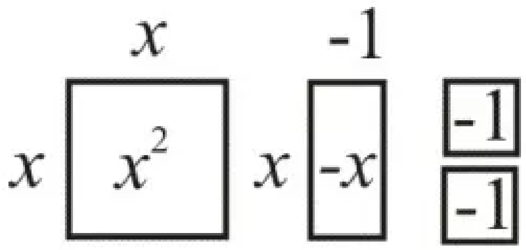
Therefore, the complete factorized form of $32a^2b+40b^3-8a^2b^2$ is $\boxed{8b(4a^2+5b^2-a^2b)}$

Answer 7AA.

Consider the trinomial $x^2 - x - 2$

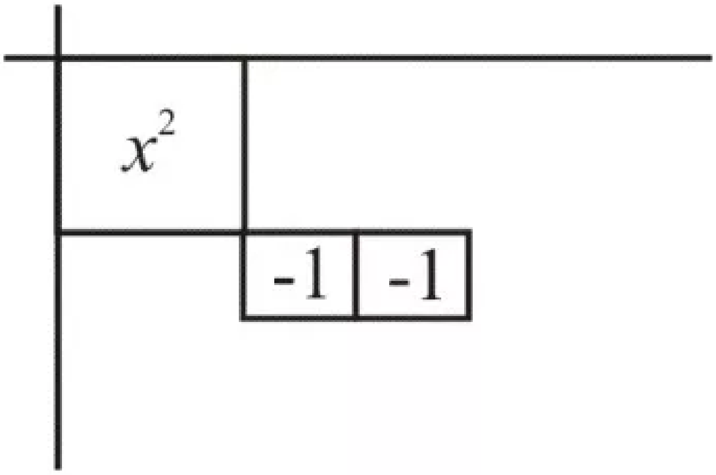
The objective is to factor $x^2 - x - 2$ using algebraic tiles.

Model of trinomial is

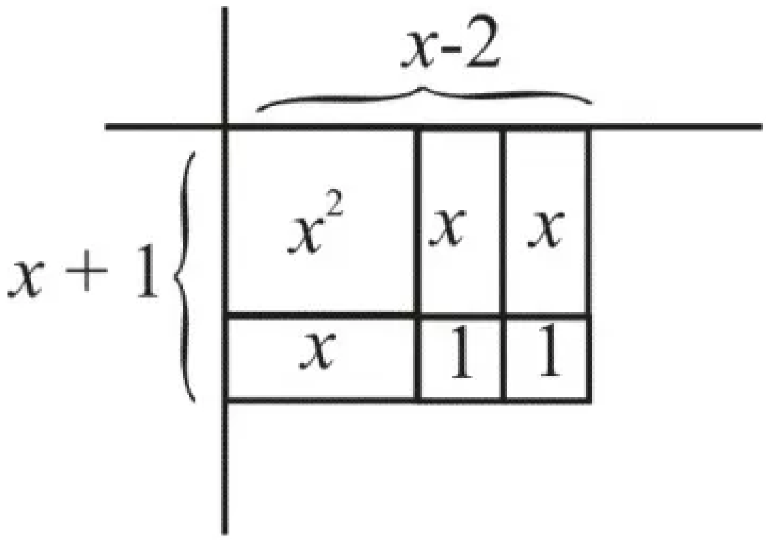


Place x^2 tiles at the corner of the product mat,

Arrange the -1 tile in to rectangular array as shown



Place the *-x* tile and add zero pairs without changing the polynomial here add a zero pair of *x* - tiles



Thus the rectangular has width of $x+1$ and length of $x-2$

Thus, $x^2 - x - 2 = (x+1)(x-2)$

Therefore, the factorization of given trinomial is $\boxed{(x+1)(x-2)}$

Answer 7CU.

Consider the polynomial $2a^3b^2+8ab+16a^2b^3$

The objective is to factors the given polynomial

For this, first find the GCF of $2a^3b^2, 8ab$ and $16a^2b^3$

$$
\begin{aligned}
2a^3b^2 &= 2\cdot a\cdot a\cdot a\cdot b\cdot b && \left[a^3=a\cdot a\cdot a, b^2=b\cdot b\right]\\
8ab &= 2\cdot 2\cdot 2\cdot a\cdot b && \left[8=2\cdot 2\cdot 2\right]\\
16a^2b^2 &= 2\cdot 2\cdot 2\cdot 2\cdot a\cdot a\cdot a\cdot b\cdot b\cdot b && \left[16=2\cdot 2\cdot 2\cdot 2, a^2=a\cdot a, b^3=b\cdot b\cdot b\right]
\end{aligned}
$$

Since GCF = The product of the common factors, which are in all the factorizations

$$
\begin{aligned}
2a^3b^2 &= 2\cdot a\cdot a\cdot a\cdot b\cdot b\\
8ab &= 2\cdot 2\cdot 2\cdot a\cdot b\\
16a^2b^2 &= 2\cdot 2\cdot 2\cdot 2\cdot a\cdot a\cdot a\cdot b\cdot b\cdot b
\end{aligned}
$$

GCF $=2\cdot a\cdot b$

$=2ab$

$$
\begin{aligned}
&2a^3b^2+8ab+16a^2b^3\\
&\quad =2\cdot a\cdot a\cdot a\cdot b\cdot b+2\cdot 2\cdot 2\cdot a\cdot b+2\cdot 2\cdot 2\cdot 2\cdot a\cdot a\cdot a\cdot b\cdot b\cdot b\\
&\quad && \left[\text{Each term as products of GCF}\right]\\
&\quad =2ab\left(a^2b\right)+2ab\left(4\right)+2ab\left(8ab^2\right) && \left[\text{Simplify}\right]\\
&\quad =2ab\left(a^2b+4\right)+2ab\left(8ab^2\right) && \left[\text{Since } a\left(a+b\right)=ab+ac\right]\\
&\quad =2ab\left(a^2b+4+8ab^2\right) && \left[\text{Apply distributive property}\right]
\end{aligned}
$$

Therefore, the complete factorized form of $2a^3b^2+8ab+16a^2b^3$ is $\boxed{2ab\left(a^2b+4+8ab^2\right)}$

Answer 7PQ.

Consider the polynomial $6py+16p-15y-40$

The objective is to factor the given polynomial

For this group the common factors and use the distributive property.

$$6py+16p-15y-40$$

$$=2\cdot3\cdot p\cdot y+2\cdot8\cdot p-3\cdot5y-2\cdot20 \quad \begin{bmatrix}6=2\cdot3,16=2\cdot8\\15=3\cdot5,40=2\cdot20\end{bmatrix}$$

$$=2\cdot3\cdot p\cdot y+2\cdot2\cdot4\cdot p-3\cdot5\cdot p-3\cdot5\cdot y-2\cdot2\cdot10$$

$$[8=2\cdot4,20=2\cdot10]$$

$$=2\cdot3\cdot p\cdot y+2\cdot2\cdot4\cdot p-3\cdot5\cdot y-2\cdot2\cdot2\cdot5$$

$$=2p(3y+8)-5(3y+8) \quad [\text{Since } a(b+c)=ab+ac]$$

$$=(2p-5)(3y+8) \quad [\text{by distributive property}]$$

$$6py+16p-15y-40=(2p-5)(3y+8)$$

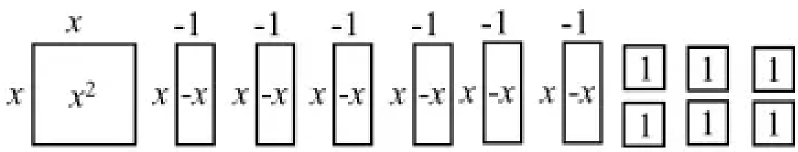
Therefore, the complete factored from of $6py+16p-15y-40$ is $\boxed{(2p-5)(3y+8)}$

Answer 8AA.

Consider the trinomial x^2-6x+8

The objective is to factor given trinomial using algebraic tiles.

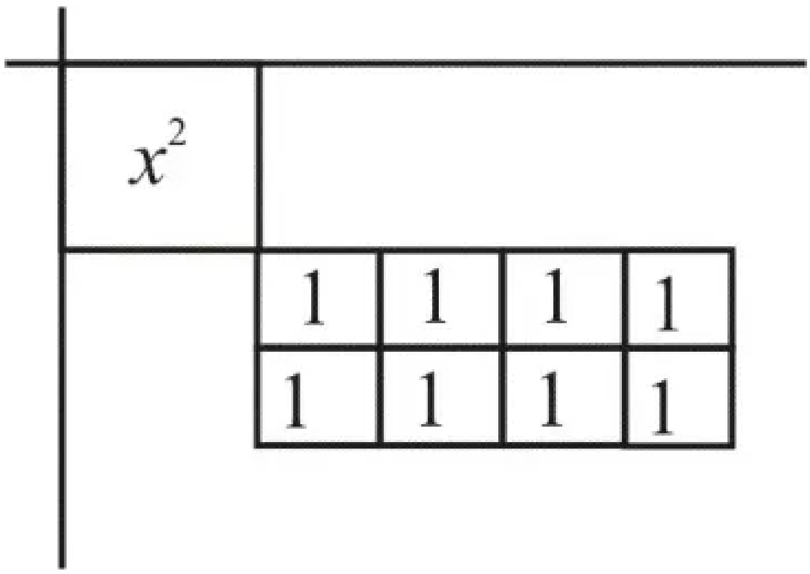
Model of trinomial is



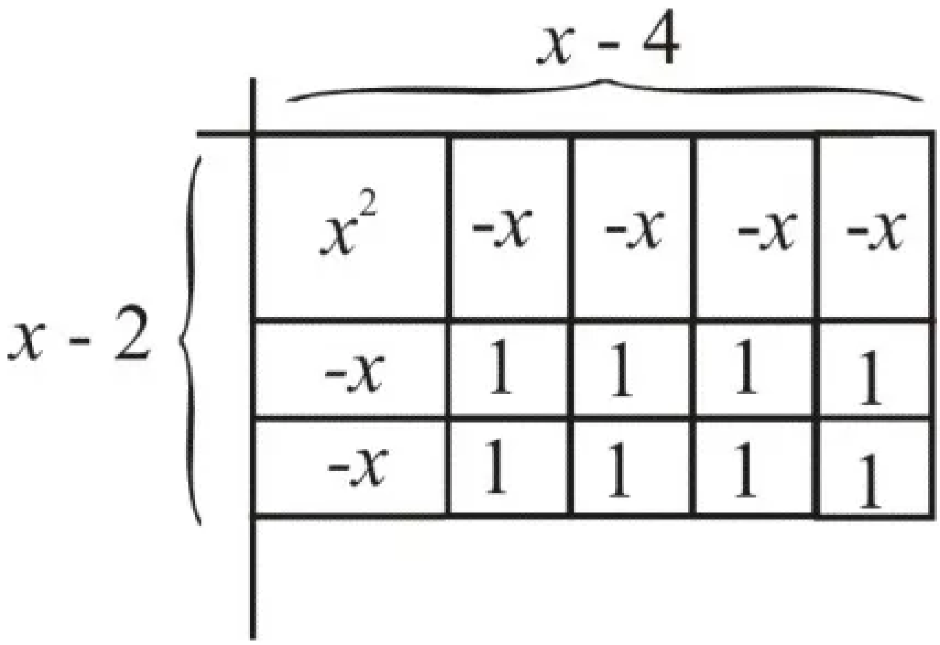
Arrange the tiles into rectangle.

Place x^2 tiles at the corner of the product mat,

Arrange the 1 tiles in to a 2-by-4 rectangular array as shown.



Place the -x tiles as follows.



Thus the rectangular has width of $x-2$ and length of $x-4$

Thus, $x^2-6x+8=(x-2)(x-4)$

Therefore, the factorization of given trinomial is $\boxed{(x-2)(x-4)}$

Answer 8CU.

Consider the polynomial $5y^2-15y+4y-12$

The objective is to factors the given polynomial

For this, group the common factors and use the distributive property.

$$\begin{aligned}5y^2-15y+4y-12 &= 5\cdot y\cdot y-3\cdot 5\cdot y+2\cdot 2\cdot y-2\cdot 6 && \left[\begin{matrix}y^2=y\cdot y, 15=3\cdot 5\\ 4=2\cdot 2, 12=2\cdot 6\end{matrix}\right]\\ &= 5y(y-3)+2\cdot 2\cdot y-2\cdot 2\cdot 3 && \left[\begin{matrix}6=2\cdot 3,\\ \text{Since } a(b+c)=ab+ac\end{matrix}\right]\\ &= 5y(y-3)+4(y-3) && [\text{Since } a(b+c)=ab+ac]\\ &= (5y+4)(y-3) && [\text{By distributive property}]\end{aligned}$$

$$5y^2-15y+4y-12=(5y+4)(y-3)$$

Therefore, the complete factored form of $5y^2-15y+4y-12$ is $\boxed{(5y+4)(y-3)}$

Answer 8PQ.

Consider the equation $(8n+5)(n-4)=0$

The objective is to find the solution set of given equation.

The zero product property is

If $ab=0$ then either $a=0\ (\text{or})\ b=0\ (\text{or})$ both.

$$(8n+5)(n-4)=0$$
$$8n+5=0\ (\text{or})\ n-4=0 \qquad (\text{by zero product property})$$

Now solve each equation.

$$8n+5=0$$
$$8n+5-5=0-5 \qquad [\text{Substract 5 on each side}]$$
$$8n=-5 \qquad [\text{Simplify}]$$
$$\frac{8n}{8}=\frac{-5}{8} \qquad [\text{Divide with 8 on both sides}]$$
$$n=\frac{-5}{8} \qquad [\text{Simplify}]$$

and

$$n-4=0$$
$$n-4+4=0+4 \qquad [\text{add 4 on each side}]$$
$$n=4 \qquad [\text{Simplify}]$$

The solution set is $\boxed{\left\{\frac{-5}{8},4\right\}}$

Check:- To check the proposed solution substitute then in the given equation

$$(8n+5)(n-4)=0$$
$$\left[8\left(\frac{-5}{8}\right)+5\right]\left[-\frac{5}{8}-4\right]=0 \qquad \left[\text{put } n=\frac{-5}{8}\right]$$
$$(-5+5)\left(-\frac{5}{8}-4\right)=0 \qquad [\text{Simplify}]$$
$$0\left(-\frac{5}{8}-4\right)=0 \qquad [\text{Simplify}]$$

$0=0$ True

$$(8n+5)(n-4)=0$$
$$(8(4)+5)(4-4)=0 \qquad [\text{put } n=4]$$
$$(32+5)(0)=0 \qquad [\text{Simplify}]$$
$$37(0)=0 \qquad [\text{Simplify}]$$

$0=0$ True

Answer 9CU.

Consider the polynomial $5c-10c^2+2d-4cd$

The objective is to factors the given polynomial.

For this, Group the common factors and use the distributive property.

$$\begin{aligned}5c-10c^2+2d-4cd &= 5\cdot c-2\cdot 5\cdot c\cdot c+2\cdot d-2\cdot 2\cdot c\cdot d && \left[10=2\cdot 5, c^2=c\cdot c\right]\\ &= 5c(1-2c)+2\cdot d-2\cdot 2\cdot c\cdot d && \left[\text{Since } a(b+c)=ab+ac\right]\\ &= 5c(1-2c)+2d(1-2c) && \left[\text{since } a(b+c)=ab+ac\right]\\ &= (5c+2d)(1-2c) && \left[\text{By distributive property}\right]\end{aligned}$$

$$5c-10c^2+2d-4cd=(5c+2d)(1-2c)$$

Therefore, the complete factored form of $5c-10c^2+2d-4cd$ is $\boxed{(5c+2d)(1-2c)}$

Answer 9PQ.

Consider the equation $9x^2 - 27x = 0$

The objective is to find the solution set of given equation

$$9x^2 - 27x = 0$$

First write the given equation in the form $ab = 0$

For this, first find the GCF of $9x^2$ and $-27x$

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$$9x^2 = 3 \cdot 3 \cdot x \cdot x \qquad [9 = 3 \cdot 3, x^2 = x \cdot x]$$

$$-27x = -1 \cdot 3 \cdot 3 \cdot 3 \cdot x \qquad [-27 = -1 \cdot 3 \cdot 3 \cdot 3]$$

GCF = $3 \cdot 3 \cdot x = 9x$

$$9x^2 - 27x = 0$$

$$9x(x-3) = 0 \quad [\text{factor the GCF of } 9x^2 - 27x \text{ that is } 9x]$$

$$9x = 0 \text{ (or) } x - 3 = 0 \quad [\text{by zero product property}]$$

Now solve each equation.

$$9x = 0$$

$$\frac{9x}{9} = \frac{0}{9} \qquad [\text{divide with 9 on each side}]$$

$$x = 0 \qquad [\text{Simplify}]$$

$$x - 3 = 0$$

$$x - 3 + 3 = 0 + 3 [\text{Add 3 on each side}]$$

$$x = 3 \qquad [\text{Simplify}]$$

The solution set is $\boxed{\{0, 3\}}$

Check: to check the proposed solution set, substitute each solution in the given equation.

$$9x^2 - 27x = 0$$

$$9(0)^2 - 27(0) = 0 \quad [\text{put } x = 0]$$

$$0 - 0 = 0 \quad [\text{Simplify}]$$

$$0 = 0 \text{ True}$$

$$9x^2 - 27x = 0$$

$$9(3)^2 - 27(3) = 0 \quad [\text{Put } x = 3]$$

$$9(9) - 81 = 0 \quad [\text{Simplify}]$$

$$81 - 81 = 0 \quad [\text{Simplify}]$$

$$0 = 0 \text{ True}$$

Therefore, the solution set is $\{0,3\}$

Answer 10CU.

Consider the equation $h(h+5) = 0$

The objective is to find the solution set of given equation.

By zero product, if $ab = 0$, either $a = 0$ (or) $b = 0$ (or) both.

$$h(h+5) = 0$$

$$h = 0 \text{ (or) } h + 5 = 0 \quad [\text{by zero product property}]$$

Now solve each equation

$$h = 0$$

$$h + 5 = 0$$

$$h + 5 - 5 = 0 - 5 \quad [\text{Substract 5 on both sides}]$$

$$h = -5$$

The solution set is $\boxed{\{0,-5\}}$

Check: substitute 0 and -5 for the given equation.

$$h(h+5)=0$$
$$0(0+5)=0 \quad [\text{put } h=0]$$
$$0(5)=0 \quad [\text{Simplify}]$$
$$0=0 \quad \text{True}$$

$$h(h+5)=0$$
$$-5(-5+5)=0 \quad [\text{pup } h=-5]$$
$$-5(0)=0 \quad [\text{Simplify}]$$
$$0=0 \text{ True}$$

Therefore, the solution set is $\{0,-5\}$

Answer 10PQ.

Consider the equation $10x^2=-3x$

The objective is to find the solution set of given equation

The zero product property is

If $ab=0$ then $a=0(\text{or})b=0$ (or) both

$$10x^2=-3x$$
$$10x^2+3x=-3x+3x \quad [\text{Add } 3x \text{ on both sides}]$$
$$10x^2+3x=0 \quad [\text{Simplify}]$$

Now write the above equation in the form $ab=0$

For this find GCF of $10x^2$ and $3x$ and then factor it

-
-

$$10x^2=2\cdot5\cdot x\cdot x \quad [10=2\cdot5, x^2=x\cdot x]$$
$$3x=3\cdot x$$

GCF = x

$$10x^2+3x=0$$
$$x(10x+3)=0$$
$$x=0 \ (\text{or}) \ 10x+3=0 \quad [\text{by zero product property}]$$

Now solve each equation.

$$x=0,$$

$$10x+3=0$$
$$10x+3-3=0-3 \quad [\text{Substract 3 on both sides}]$$
$$10x=-3 \quad [\text{Simplify}]$$
$$\frac{10x}{10}=\frac{-3}{10} \quad [\text{divide with 10 on each side}]$$
$$x=\frac{-3}{10}$$

The solution set is $\boxed{\left\{0,\frac{-3}{10}\right\}}$

Check: to check the proposed solution set, substitute each solution in the given equation.

$$10x^2 = -3x$$

$$10(0)^2 = -3(0) \qquad [\text{put } x = 0]$$

$$0 = 0 \text{ True}$$

$$10x^2 = -3x$$

$$10\left(\frac{-3}{10}\right)^2 = -3\left(-\frac{3}{10}\right) \quad \left[\text{put } x = -\frac{3}{10}\right]$$

$$10\left(\frac{9}{100}\right) = \frac{9}{10} \qquad [\text{Simplify}]$$

$$\frac{9}{10} = \frac{9}{10} \qquad \left[\text{Simplify, } \frac{10}{100} = \frac{1}{10}\right]$$

$$\text{True}$$

Therefore, the solution set is $\left\{0, \frac{-3}{10}\right\}$

Answer 11CU.

Consider the equation $(n-4)(m+2)=0$

The objective is to find the solution set of given equation.

By zero product, if $ab=0$, either $a=0\ (\text{or})\ b=0$ (or) both.

$$(n-4)(m+2)=0$$

$$n-4=0\ (\text{or})\ n+2=0 \quad [\text{by zero product property}]$$

Now solve each equation

$$n-4=0$$

$$n-4+4=0+4 \qquad [\text{Add 4 on both side}]$$

$$n=4 \qquad [\text{Simplify}]$$

The solution set is $\boxed{\{4,-2\}}$

Check: To check the proposed solution, substitute then in the given equation.

$$(n-4)(n+2)=0$$

$$(4-4)(4+2)=0 \qquad (\text{put } n=4)$$

$$0(6)=0 \qquad (\text{Simplify})$$

$$0=0 \text{ True}$$

$$(n-4)(n+2)=0$$

$$(-2-4)(-2+2)=0 \qquad [\text{put } n=-2]$$

$$(-6)(0)=0 \qquad [\text{Simplify}]$$

$$0=0 \text{ True}$$

Therefore, the solution set is $\{4,-2\}$

Answer 12CU.

Consider the equation $5m = 3m^2$

The objective is to find the solution set of given equation.

By zero product, if $ab = 0$, either $a = 0\ (\text{or})\ b = 0$ (or) both.

$$5m = 3m^2$$
$$5m - 5m = 3m^2 - 5m \quad [\text{Subtract } 5m \text{ on each side}]$$
$$0 = 3m^2 - 5m \quad [\text{Simplify}]$$
$$3m^2 - 5m = 0$$

Now write the above equation in the form $ab = 0$

For this find GCF of $3m^2$ and $-5m$ and then factor it.

$$3m^2 = 3 \cdot m \cdot m \qquad [m^2 = m \cdot m]$$
$$-5m = -5 \cdot m$$
$$\text{GCF} = m$$
$$3m^2 - 5m = 0$$
$$m(3m - 5) = 0$$
$$m = 0\ (\text{or})\ 3m - 5 = 0 \quad (\text{By zero prodcut property})$$

Now solve each equation.

$m = 0$,

$$3m - 5 = 0$$
$$3m - 5 + 5 = 0 + 5 \qquad [\text{Add 5 on each side}]$$
$$3m = 5 \qquad [\text{Simplify}]$$
$$\frac{3m}{3} = \frac{5}{3} \qquad [\text{Divide with 3 on both sides}]$$
$$m = \frac{5}{3}$$

The solution set is $m = \boxed{\left\{0, \frac{5}{3}\right\}}$

Check: To check the proposed solution set substitute each solution in the given equation.

$$5m = 3m^2$$

$$5(0) = 3(0)^2 \quad [\text{put } m = 0]$$

$$0 = 0 \text{ True}$$

$$5m = 3m^2$$

$$5\left(\frac{5}{3}\right) = 3\left(\frac{5}{3}\right)^2 \qquad \left[\text{put } m = \frac{5}{3}\right]$$

$$\frac{25}{3} = 3\left(\frac{25}{9}\right) \qquad [\text{Simplify}]$$

$$\frac{25}{3} = \frac{25}{3} \qquad \left[\text{Simplify, } \frac{3}{9} = \frac{1}{3}\right]$$

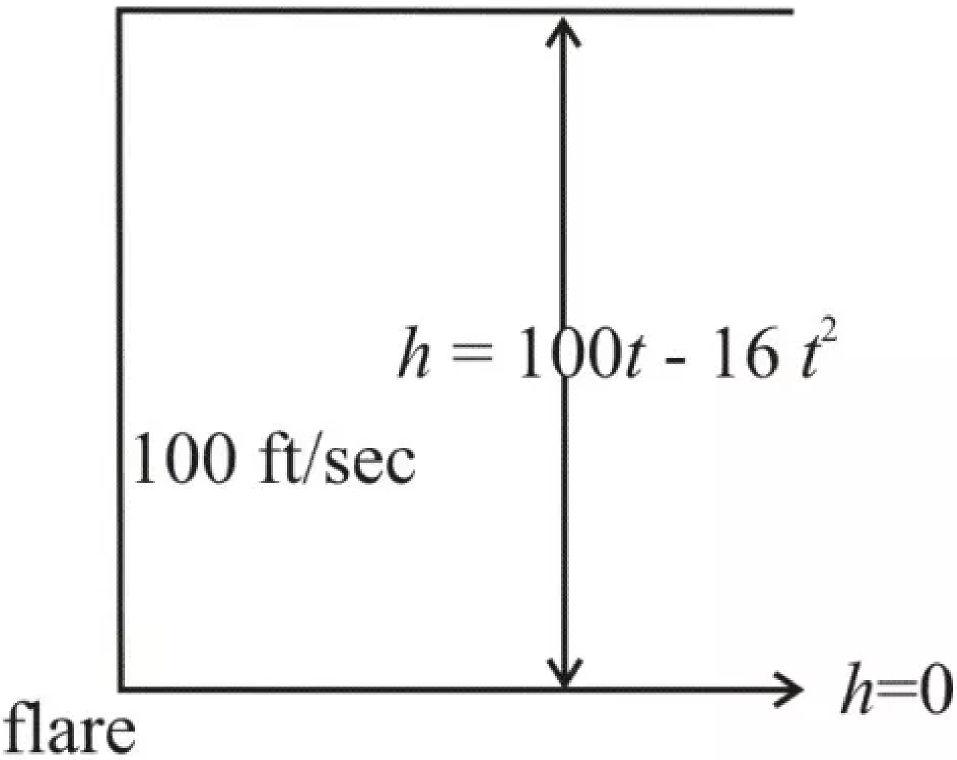
True

Therefore, the solution set is $\left\{0, \frac{5}{3}\right\}$

Answer 13CU.

Consider that a flare is launched from a life raft.

The height h of the flare in feet above the set is where t is time in seconds after the flare is launched.



The objective is to find the height of the flare when it returns to the sea.

When it returns to the sea, the height is 0 ft.

The flare returns to the sea, at the height 0 ft.

Answer 14CU.

Consider the equation $h = 10t - 16t^2$

By putting $h = 0$, $0 = 100t - 16t^2$

The objective is to solve the above equation for *ti*.

$$0 = 100t - 16t^2$$

$$100t - 16t^2 = 0$$

For this first find the GCD of 100*t* and $16t^2$.

$$\begin{aligned} 100t &= 2 \cdot 50 \cdot t & [100 = 2 \cdot 50] \\ &= 2 \cdot 2 \cdot 25 \cdot t & [50 = 2 \cdot 25] \\ &= 2 \cdot 2 \cdot 5 \cdot 5 \cdot t & [25 = 5 \cdot 5] \end{aligned}$$

$$\begin{aligned} 16t^2 &= 2 \cdot 8t^2 & [16 = 2 \cdot 8] \\ &= 2 \cdot 2 \cdot 4 \cdot t^2 & [8 = 2 \cdot 4] \\ &= 2 \cdot 2 \cdot 2 \cdot 2 \cdot t^2 & [4 = 2 \cdot 2] \\ &= 2 \cdot 2 \cdot 2 \cdot 2 \cdot t \cdot t & [t^2 = t \cdot t] \end{aligned}$$

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$$100t = 2 \cdot 2 \cdot 5 \cdot 5 \cdot t$$

$$16t^2 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot t \cdot t$$

GCD = The product of prime factors common in each factorization

$$= 2 \cdot 2 \cdot t$$

$$= 4t$$

$$100t - 16t^2 = 0$$
$$2 \cdot 2 \cdot 5 \cdot 5 \cdot t - 2 \cdot 2 \cdot 2 \cdot 2 \cdot t \cdot t = 0$$
$$4t(25) - 4t(4t) = 0$$
$$4t(25 - 4t) = 0 \qquad [a(b+c) = ab + ac]$$

By zero product property, of $ab = 0$ $ab = 0 \Rightarrow a = 0 \text{ or } b = 0$ or both

$$4t = 0$$
$$\frac{4t}{4} = \frac{0}{4} \qquad [\text{Divide with 4 on each side}]$$
$$t = 0$$

$$25 - 4t = 0$$
$$25 - 4t + 4t = 0 + 4t \qquad [\text{Add } 4t \text{ on each side}]$$
$$25 = 4t$$
$$\frac{25}{4} = \frac{4t}{4} \qquad [\text{Divide with 4 on each side}]$$
$$t = \frac{25}{4}$$

The solution set is $\boxed{\left\{0, \frac{25}{4}\right\}}$

Answer 15CU.

Consider that a flare is launched from a life raft.

The height *h* of the flare in feet above the sea is modeled by the formula $h=100t-16t^2$

The objective is to find the number of seconds will it take for the flare to return to the sea.

When the flare return to the sea the height of flare

$h=0,$

$$h=100t-16t^2$$
$$0=100t-16t^2 \qquad [\text{put } h=0]$$

$100t-16t^2=0$

The objective is to solve the above equation for *ti.*

$$0=100t-16t^2$$

$100t-16t^2=0$

For this first find the GCD of 100*t* and $16t^2$.

$$\begin{aligned} 100t &= 2\cdot 50\cdot t && [100=2\cdot 50] \\ &= 2\cdot 2\cdot 25\cdot t && [50=2\cdot 25] \\ &= 2\cdot 2\cdot 5\cdot 5\cdot t && [25=5\cdot 5] \end{aligned}$$

$$\begin{aligned} 16t^2 &= 2\cdot 8t^2 && [16=2\cdot 8] \\ &= 2\cdot 2\cdot 4\cdot t^2 && [8=2\cdot 4] \\ &= 2\cdot 2\cdot 2\cdot 2\cdot t^2 && [4=2\cdot 2] \\ &= 2\cdot 2\cdot 2\cdot 2\cdot t\cdot t && [t^2=t\cdot t] \end{aligned}$$

O

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$100t=2\cdot 2\cdot 5\cdot 5\cdot t$

$16t^2=2\cdot 2\cdot 2\cdot 2\cdot t\cdot t$

GCD = The product of prime factors common in each factorization

$= 2 \cdot 2 \cdot t$

$= 4t$

$$100t - 16t^2 = 0$$

$$2 \cdot 2 \cdot 5 \cdot 5 \cdot t - 2 \cdot 2 \cdot 2 \cdot 2 \cdot t \cdot t = 0$$

$$4t(25) - 4t(4t) = 0$$

$$4t(25 - 4t) = 0 \qquad [a(b+c) = ab + ac]$$

By zero product property, of $ab = 0$ $ab = 0 \Rightarrow a = 0 \text{ or } b = 0$ or both

$4t = 0$

$\frac{4t}{4} = \frac{0}{4} \qquad$ [Divide with 4 on each side]

$t = 0$

$25 - 4t = 0$

$25 - 4t + 4t = 0 + 4t \qquad$ [Add $4t$ on each side]

$25 = 4t$

$\frac{25}{4} = \frac{4t}{4} \qquad$ [Divide with 4 on each side]

$t = \frac{25}{4}$

The solution set is $\boxed{\left\{0, \frac{25}{4}\right\}}$

$t = 0 \text{ or } t = \frac{25}{4}$

Hence at $t = \frac{25}{4} = 6.25 \text{ sec}$

The flare return to the sea after $\boxed{6.25 \text{ seconds}}$

Answer 16PA.

Consider the polynomial $5x+30y$

The objective is to factor the given polynomial.

For this, first find the GCF of $5x$ and $30y$

$$5x = 5\cdot x$$
$$\begin{aligned} 30y &= 30\cdot y \\ &= 2\cdot 15\cdot y && [30 = 2\cdot 15] \\ &= 2\cdot 3\cdot 5\cdot y && [15 = 3\cdot 5] \end{aligned}$$

0

GCF = The product of the prime factors common to each prime factorization.

0

$$5x = 5\cdot x$$
$$30y = 2\cdot 3\cdot 5\cdot y$$

GCF $=5$

$$\begin{aligned} 5x+30y^3 &= 5\cdot x + 5\cdot 6y && \left[\begin{array}{l}\text{Write each as the prodcut of GCF} \\ \text{and its remaining factors}\end{array}\right] \\ &= 5(x+6y) && [\text{By distributive } a(b+c)] \end{aligned}$$
$$5x+30y^3 = 5(x+6y)$$

Therefore, the complete factored form of $5x+30y^3$ is $\boxed{5(x+6y)}$

Answer 17PA.

Consider the polynomial $16a+4b$

The objective is to factor the given polynomial

For this, first find the GCF of 16*a* and 4*b*.

$$
\begin{aligned}
16a &= 4\cdot 4a && [16 = 4\cdot 4] \\
&= 2\cdot 2\cdot 2\cdot 2\cdot a && [4 = 2\cdot 2] \\
4b &= 2\cdot 2\cdot b && [4 = 2\cdot 2]
\end{aligned}
$$

GCF = The product of the prime factors common to each prime factorization

O

O

O

O

$$16a = 2\cdot 2\cdot 2\cdot 2\cdot a$$
$$4b = 2\cdot 2\cdot b$$

GCF $= 2\cdot 2$

$= 4$

$$
\begin{aligned}
14a+4b &= 4\cdot 4\cdot a + 4\cdot b && \left[\begin{array}{l}\text{Write each as the product of} \\ \text{GCF and its remaining factors}\end{array}\right] \\
&= 4(4a+n) && \left[\begin{array}{l}\text{By distribution property,} \\ a(b+c) = a\cdot b + a\cdot c\end{array}\right]
\end{aligned}
$$

$$14a+4b = 4(4a+n)$$

Therefore, the complete factored form of $14a+4b$ is $\boxed{4(4a+n)}$

Answer 18PA.

Consider the polynomial a^5b-a

The objective is to factor the given polynomial.

For this, first find the GCF of x^3y^2 and x.

$$a^5b = a\cdot a^4\cdot b \qquad (a^5 = a\cdot a^4)$$
$$-a = a\cdot(-1) \qquad (-a = a(-1))$$

GCF = The product of the prime factors common to each prime factorization.

O

O

$$a^5b = a\cdot a^4\cdot b$$
$$-a = a\cdot -1$$

$$a^5b-a = a\cdot a^4\cdot b-1\cdot a \qquad \left[\begin{array}{l}\text{Write each as the product of}\\ \text{GCF and its remining factors}\end{array}\right]$$
$$= a(a^4b-1) \qquad [\text{by distributive, } a(b+c)=ab+ac]$$
$$a^5b-a = a(a^4b-1)$$

Therefore, the complete factored form of a^5b-a is $\boxed{a(a^4b-1)}$

Answer 19PA.

Consider the polynomial x^3y^2+x

The objective is to factor the given polynomial.

For this, first find the GCF of x^3y^2 and *x*.

$$x^3y^2 = x\cdot x^2\cdot y^2 \qquad \left(x^3 = x\cdot x^2\right)$$
$$x = x\cdot 1 \qquad \left(x = 1\cdot x\right)$$

GCF = The product of the prime factors common to each prime factorization.

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$$x^3y^2 = x\cdot x^2\cdot y^2$$
$$x = x\cdot 1$$

$$x^3y^2+x = x\cdot x^2\cdot y^2 + x\cdot 1 \qquad \left[\begin{array}{l}\text{Write each as the product of}\\ \text{GCF and its remining factors}\end{array}\right]$$

$$= x\left(x^2y^2+1\right) \qquad \left[\text{by distributive, } a(b+c)=ab+ac\right]$$

$$x^3y^2+x = x\left(x^2y^2+1\right)$$

Therefore, the complete factored form of x^3y^2+x is $\boxed{x\left(x^2y^2+1\right)}$

Answer 20PA.

Consider the polynomial $21cd - 3d$

The objective is to factor the given polynomial.

For this, first find the GCF of x^3y^2 and x.

$$21cd = 3 \cdot 7 \cdot c \cdot d \qquad (21 = 3 \cdot 7)$$
$$-3d = 3 \cdot -1 \cdot d \qquad (-3 = 3 \cdot -1)$$

GCF = The product of the prime factors common to each prime factorization.

$$21cd = 3 \cdot 7 \cdot c \cdot d$$
$$-3d = 3 \cdot -1 \cdot d$$

$$\begin{aligned} 21cd - 3d &= 3 \cdot 7 \cdot c \cdot d - 1 \cdot 3 \cdot d && \left[\begin{array}{l}\text{Write each as the product of} \\ \text{GCF and its remining factors}\end{array}\right] \\ &= 3d(7c - 1) && \left[\text{by distributive, } a(b+c) = ab + ac\right] \end{aligned}$$

$$21cd - 3d = 3d(7c - 1)$$

Therefore, the complete factored form of $21cd - 3d$ is $\boxed{3d(7c - 1)}$

Answer 21PA.

Consider the polynomial $14gh-18h$

The objective is to factor the given polynomial.

For this, first find the GCF of $14gh$ and $18h$

$$14gh = 2\cdot 7\cdot g\cdot h \qquad (14 = 2\cdot 7)$$
$$-18h = 2\cdot -9\cdot h \qquad (-18 = 2\cdot -9)$$

GCF = The product of the prime factors common to each prime factorization.

$$14gh = 2\cdot 7\cdot g\cdot h$$
$$-18h = 2\cdot -9\cdot h$$

GCF $= 2h$

$$14gh-18h = 2\cdot 7\cdot g\cdot h + 2\cdot 2\cdot h \qquad \begin{bmatrix}\text{Write each as the product of} \\ \text{GCF and its remining factors}\end{bmatrix}$$
$$= 2h(7h-9) \qquad [\text{by distributive, } a(b+c) = ab+ac]$$
$$14gh-18h = 2h(7h-9)$$

Therefore, the complete factored form of $14gh-18h$ is $\boxed{2h(7h-9)}$

Answer 22PA.

Consider the polynomial $15a^2y-30ay$

The objective is to factor the given polynomial.

For this, first find the GCF of $15a^2y$ and $30ay$

$$15a^2y = 3\cdot 5\cdot a\cdot a\cdot y \qquad \left(15 = 3\cdot 5 \text{ and } a^2 = a\cdot a\right)$$

$$30ay = 3\cdot 10\cdot a\cdot y \qquad \left(-30 = 3\cdot -10\right)$$

$$= 3\cdot 5\cdot -2\cdot a\cdot y \qquad \left[-10 = 5\cdot -2\right]$$

GCF = The product of the prime factors common to each prime factorization.

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$$15a^2y = 3\cdot 5\cdot a\cdot a\cdot y$$

$$30ay = 3\cdot 5\cdot -2\cdot a\cdot y$$

GCF $= 3\cdot 5\cdot a$

$= 15ay$

$$15a^2y-30ay = 15\cdot a\cdot a\cdot y - 15\cdot a\cdot 2\cdot y \qquad \left[\begin{array}{l}\text{Write each as the product of}\\ \text{GCF and its remining factors}\end{array}\right]$$

$$= 15ay(a-2) \qquad \left[\text{by distributive, } a(b+c) = ab+ac\right]$$

$$15a^2y-30ay = 15ay(a-2)$$

Therefore, the complete factored form of $15a^2y-30ay$ is $\boxed{15ay(a-2)}$

Answer 23PA.

Consider the polynomial $8bc^2 + 24bc$

The objective is to factor the given polynomial.

For this, first find the GCF of $8bc^2$ and $24bc$

$$8bc^2 = 2 \cdot 4 \cdot b \cdot c \cdot c \qquad \left(8 = 2 \cdot 4 \text{ and } c^2 = c \cdot c\right)$$

$$24bc = 8 \cdot 3 \cdot b \cdot c \qquad (24 = 8 \cdot 3)$$

$$= 2 \cdot 4 \cdot 3 \cdot b \cdot c \qquad (8 = 2 \cdot 4)$$

GCF = The product of the prime factors common to each prime factorization.

$$8bc^2 = 2 \cdot 4 \cdot b \cdot c \cdot c$$

$$24bc = 2 \cdot 4 \cdot 3 \cdot b \cdot c$$

GCF $= 2 \cdot 4 \cdot b \cdot c$

$= 8bc$

$$8bc^2 + 24bc = 8 \cdot b \cdot c \cdot c + 8 \cdot 3 \cdot b \cdot c \qquad \left[\begin{array}{l}\text{Write each as the product of} \\ \text{GCF and its remining factors}\end{array}\right]$$

$$= 8bc(c+3) \qquad \left[\text{by distributive, } a(b+c) = ab + ac\right]$$

$$8bc^2 + 24bc = 8bc(c+3)$$

Therefore, the complete factored form of $8bc^2 + 24bc$ is $\boxed{8bc(c+3)}$

Answer 24PA.

Consider the polynomial $12x^2y^2z + 40xy^3z^2$

The objective is to factor the given polynomial.

For this, first find the GCF of $12x^2y^2z$ and $40xy^3z^2$

$$12x^2y^2z = 2\cdot 6\cdot x\cdot x\cdot y^2\cdot z \qquad (12 = 2\cdot 6)$$

$$\begin{aligned} 40xy^3z^2 &= 8\cdot 5\cdot x\cdot y^3\cdot z^2 && (40 = 8\cdot 5) \\ &= 2\cdot 4\cdot 5\cdot x\cdot y^3\cdot z^2 && (8 = 2\cdot 4) \\ &= 2\cdot 4\cdot 5\cdot x\cdot x\cdot y\cdot y^2\cdot z\cdot z \end{aligned}$$

GCF = The product of the prime factors common to each prime factorization.

$$12x^2y^2z = 2\cdot 6\cdot x\cdot x\cdot y^2\cdot z$$

$$40xy^3z^2 = 2\cdot 4\cdot 5\cdot x\cdot x\cdot y\cdot y^2\cdot z\cdot z$$

GCF $= 2\cdot x\cdot y^2\cdot z$

$= 2xy^2z$

$$\begin{aligned} 12x^2y^2z + 40xy^3z^2 &= 2\cdot x\cdot y^2z\cdot 6\cdot x + 2\cdot xy^2z\cdot 20yz && \left[\text{Write each as the product of GCF and its remining factors}\right] \\ &= 2xy^2z(6x + 20yz) && \left[\text{by distributive, } a(b+c) = ab + ac\right] \end{aligned}$$

$$12x^2y^2z + 40xy^3z^2 = 2xy^2z(6x + 20yz)$$

Therefore, the complete factored form of $12x^2y^2z + 40xy^3z^2$ is $\boxed{2xy^2z(6x + 20yz)}$

Answer 25PA.

Consider the polynomial $18a^2bc^2 - 48abc^3$

The objective is to factor the given polynomial.

For this, first find the GCF of $18a^2bc^2$ and $48abc^3$

$$18a^2bc^2 = 2\cdot 9\cdot a\cdot a\cdot b\cdot c\cdot c \qquad \left(18 = 2\cdot 9 \text{ and } a^2 = a\cdot a, c^2 = c\cdot c\right)$$
$$= 2\cdot 3\cdot 3\cdot a\cdot a\cdot b\cdot c\cdot c \qquad (9 = 3\cdot 3)$$
$$-48abc^3 = -16\cdot 3\cdot a\cdot b\cdot c\cdot c^2 \qquad \left(-48 = -16\cdot 3 \text{ and } c^3 = c\cdot c^2\right)$$
$$= -8\cdot 2\cdot 3\cdot a\cdot b\cdot c\cdot c^2 \qquad (-16 = -8\cdot 2)$$

GCF = The product of the prime factors common to each prime factorization.

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$$18a^2bc^2 = 2\cdot 3\cdot 3\cdot a\cdot a\cdot b\cdot c\cdot c$$
$$-48abc^3 = -8\cdot 2\cdot 3\cdot a\cdot b\cdot c\cdot c^2$$

GCF $= 2\cdot 3\cdot a\cdot b\cdot c$

$= 6abc$

$$18a^2bc^2 - 48abc^3 = 6abc\cdot 3ac - 6abc\cdot 8c^2 \qquad \left[\begin{matrix}\text{Write each as the product of}\\ \text{GCF and its remining factors}\end{matrix}\right]$$
$$= 6abc\left(3ac - 8c^2\right) \qquad \left[\text{by distributive, } a(b+c) = ab + ac\right]$$
$$18a^2bc^2 - 48abc^3 = 6abc\left(3ac - 8c^2\right)$$

Therefore, the complete factored form of $18a^2bc^2 - 48abc^3$ is $\boxed{6abc\left(3ac - 8c^2\right)}$

Answer 26PA.

Consider the polynomial $a+a^2b^2+a^3b^3$

The objective is to factor the given polynomial.

For this, first find the GCF of a, a^2b^2 and a^3b^3

$$a = a$$
$$a^2b^2 = a\cdot a\cdot b\cdot b \qquad [a^2 = a\cdot a, b^2 = b\cdot b]$$
$$a^3b^3 = a\cdot a\cdot a\cdot b\cdot b\cdot b \quad [a^3 = a\cdot a\cdot a, b^3 = b\cdot b\cdot b]$$

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GCF = The product of the prime factors common to each prime factorization.

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$$a = a$$
$$a^2b^2 = a\cdot a\cdot b\cdot b$$
$$a^3b^3 = a\cdot a\cdot a\cdot b\cdot b\cdot b$$

GCF $= a$

$$\begin{aligned} a+a^2b^2+a^3b^3 &= a + a\cdot a\cdot b\cdot b + a\cdot a\cdot a\cdot b\cdot b\cdot b && [\text{each term as product of GCF}] \\ &= a + a\left(ab^2\right) + a\left(a^2b^3\right) && [\text{Simplify}] \\ &= a\left(1+ab^2+a^2b^3\right) && [\text{Apply distributive}] \end{aligned}$$

Therefore, the complete factored form of $a+a^2b^2+a^3b^3$ is $\boxed{a\left(1+ab^2+a^2b^3\right)}$

Answer 27PA.

Consider the polynomial $15x^2y^2+25xy+x$

The objective is to factor the given polynomial.

For this, first find the GCF of $15x^2y^2, 25xy$ and x

$$15x^2y^2 = 3\cdot5\cdot x\cdot x\cdot y\cdot y \qquad [15=3\cdot5, x^2 = x\cdot x, y^2 = y\cdot y]$$
$$25xy = 5\cdot5\cdot x\cdot y \qquad [25=5\cdot5]$$
$$x = x$$

GCF = The product of the prime factors common to each prime factorization.

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$$15x^2y^2 = 3\cdot5\cdot x\cdot x\cdot y\cdot y$$
$$25xy = 5\cdot5\cdot x\cdot y$$
$$x = x$$

GCF $=x$

$$\begin{aligned}
15x^2y^2+25xy+x &= 3\cdot5\cdot x\cdot x\cdot y\cdot y+5\cdot5\cdot x\cdot y+x && [\text{Each terms as products of GCF}]\\
&= x(15xy^2)+x(25y)+x && [\text{Simplify}]\\
&= x(15xy^2+1)+x(25y) && [\text{By distributive } a(b+c)]\\
&= x(15xy^2+25y+1) && [\text{Apply distributive}]
\end{aligned}$$

Therefore, the complete factored form of $15x^2y^2+25xy+x$ is $\boxed{x(15xy^2+25y+1)}$

Answer 28PA.

Consider the polynomial $12ax^3 + 20bx^2 + 32cx$

The objective is to factor the given polynomial.

For this, first find the GCF of $12ax^3, 20bx^2$ and $32cx$

$$12ax^3 = 2 \cdot 2 \cdot 3 \cdot a \cdot x \cdot x \cdot x \qquad \left[12 = 2 \cdot 2 \cdot 3, x^3 = x \cdot x \cdot x\right]$$

$$20bx^2 = 2 \cdot 2 \cdot 5 \cdot b \cdot x \cdot x \qquad \left[20 = 2 \cdot 2 \cdot 5, x^2 = x \cdot x\right]$$

$$32cx = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot c \cdot x \qquad \left[32 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2\right]$$

GCF = The product of the prime factors common to each prime factorization.

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$$12ax^3 = 2 \cdot 2 \cdot 3 \cdot a \cdot x \cdot x \cdot x$$

$$20bx^2 = 2 \cdot 2 \cdot 5 \cdot b \cdot x \cdot x$$

$$32cx = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot c \cdot x$$

GCF $= 2 \cdot 2 \cdot x$

$= 4x$

$$12ax^3 + 20bx^2 + 32cx = 2 \cdot 2 \cdot 3 \cdot a \cdot x \cdot x \cdot x + 2 \cdot 2 \cdot 5 \cdot b \cdot x \cdot x + 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot c \cdot x$$

$$\left[\text{Write each term as product of GCF}\right]$$

$$= 4x\left(3ax^2 + 5bx + 8c\right) \quad \left[\text{By distributive } a\left(b+c\right)\right]$$

$$12ax^3 + 20bx^2 + 32cx = 4x\left(3ax^2 + 5bx + 8c\right)$$

Therefore, the complete factored form of $12ax^3 + 20bx^2 + 32cx$ is $\boxed{4x\left(3ax^2 + 5bx + 8c\right)}$

Answer 29PA.

Consider the polynomial $3p^3q - 9pq^2 + 36pq$

The objective is to factor the given polynomial.

For this, first find the GCF of $3p^3q, -9pq^2$ and $36pq$

$$3p^3q = 3 \cdot p \cdot p \cdot p \cdot q \qquad [p^3 = p \cdot p \cdot p]$$

$$-9pq^2 = -3 \cdot 3 \cdot p \cdot q \cdot q \qquad [-9 = -3 \cdot 3, q^2 = q \cdot q]$$

$$36pq = 6 \cdot 6 \cdot pq \qquad [36 = 6 \cdot 6]$$

$$= 3 \cdot 2 \cdot 6 \cdot p \cdot q \qquad [6 = 3 \cdot 2]$$

Since GCF = The product of the common factors which are in all the factorizations.

$$3p^3q = 3\cdot p\cdot p\cdot p\cdot q$$
$$-9pq^2 = -3\cdot 3\cdot p\cdot q\cdot q$$
$$36pq = 3\cdot 2\cdot 6\cdot p\cdot q$$

GCF $= 3\cdot p\cdot q$

$= 2pq$

$$3p^3q - 9pq^2 + 36pq$$
$$= 3\cdot p\cdot p\cdot p\cdot q - -3\cdot 3\cdot p\cdot q\cdot q + 3\cdot 2\cdot 6\cdot p\cdot q$$
[Write each term as product of GCF]
$$= 3pq(p^2) + 3pq(-3q) + 3pq(12)$$
[Simplify]

Distributive property is $a(b+c) = ab + ac$

$$= 3pq(p^2 - 3q + 12) \qquad \text{[Apply distributive]}$$

$$3p^3q - 9pq^2 + 36pq = 3pq(p^2 - 3q + 12)$$

Therefore, the complete factorized form of $3p^3q - 9pq^2 + 36pq$ is $\boxed{3pq(p^2 - 3q + 12)}$

Answer 30PA.

Consider the polynomial $x^2 + 2x + 3x + 6$

The objective is to factor the given polynomial.

For this group the common factors, and use the distributive property

$$x^2 + 2x + 3x + 6 = x\cdot x + 2\cdot x + 3\cdot x + 6 \qquad [x^2 = x\cdot x]$$
$$= (x+2)x + 3x + 6 \qquad [\text{Sunce } (b+c)a = ba + ca]$$
$$= (x+2)x + 3\cdot x + 3\cdot 2 \qquad [3\cdot 2 = 6]$$
$$= (x+2)x + 3(x+2) \qquad [\text{Since } a(b+c) = ab + ac]$$
$$= (x+3)(x+2) \qquad \text{[By distributive property]}$$

Therefore, the complete factored form of $x^2 + 2x + 3x + 6$ is $\boxed{(x+3)(x+2)}$

Answer 31PA.

Consider the polynomial $x^2+5x+7x+35$

The objective is to factor the given polynomial.

For this, Group the common factors, and use the distributive property.

$$
\begin{aligned}
x^2+5x+7x+35 &= x\cdot x+5\cdot x+7\cdot x+35 && [x^2 = x\cdot x] \\
&= (x+5)x+7x+35 && [\text{Since } a(b+c)=ab+ac] \\
&= (x+5)x+7\cdot x+7\cdot 5 && [35=7\cdot 5] \\
&= (x+5)x+7(x+5) && [\text{Since } a(b+c)=ab+ac]
\end{aligned}
$$

$$= (x+5)(x+7) \qquad [\text{By distributive property}]$$

Therefore, the complete factored form of $x^2+5x+7x+35$ is $\boxed{(x+5)(x+7)}$

Answer 32PA.

Consider the polynomial $4x^2+14x+6x+21$

The objective is to factor the given polynomial.

For this, Group the common factors and use the distributive property

$$
\begin{aligned}
4x^2+14x+6x+21 &= 4\cdot x\cdot x+14\cdot x+6\cdot x+21 && [x^2 = x\cdot x] \\
&= 2\cdot 2\cdot x\cdot x+2\cdot 7\cdot x+2\cdot 3\cdot x+7\cdot 3 && [4=2\cdot 2, 14=2\cdot 7] \\
&= 2\cdot 2\cdot 3\cdot y\cdot y+3\cdot 3\cdot y+2\cdot 4\cdot y+2\cdot 3 && [6=2\cdot 3, 21=3\cdot 7] \\
&= 2x(2x+7)+2\cdot 3\cdot x+7\cdot 3 && [\text{Since } a(b+c)=ab+ac]
\end{aligned}
$$

$$
\begin{aligned}
&= 2x(2x+7)+3(2x+7) && [\text{Since } a(b+c)=ab+ac] \\
&= (2x+3)(2x+7) && [\text{By distributive property}]
\end{aligned}
$$

Therefore, the complete factorized form of $4x^2+14x+6x+21$ is $\boxed{(2x+3)(2x+7)}$

Answer 33PA.

Consider the polynomial $12y^2+9y+8y+6$

The objective is to factor the given polynomial.

For this, Group the common factors and use the distributive property

$$\begin{aligned}
12y^2+9y+8y+6 &= 12\cdot y\cdot y+9\cdot y+8\cdot y+6 && [y^2=y\cdot y]\\
&= 2\cdot 6\cdot y\cdot y+3\cdot 3\cdot y+8\cdot y+6 && [12=2\cdot 6, 9=3\cdot 3]\\
&= 2\cdot 2\cdot 3\cdot y\cdot y+3\cdot 3\cdot y+2\cdot 4\cdot y+2\cdot 3 && [6=2\cdot 3, 8=2\cdot 4]\\
&= 3y(4y+3)+2\cdot 4y+2\cdot 3 && [\text{Since } a(b+c)=ab+ac]
\end{aligned}$$

$$\begin{aligned}
&= 3y(4y+3)+2(4y+3) && [\text{Since } a(b+c)=ab+ac]\\
&= (3y+2)(4y+3) && [\text{By distributive property}]
\end{aligned}$$

Therefore, the complete factorized form of $12y^2+9y+8y+6$ is $\boxed{(3y+2)(4y+3)}$

Answer 34PA.

Consider the polynomial $6a^2-15a-8a+20$

The objective is to factor the given polynomial.

For this, Group the common factors and use the distributive property

$$\begin{aligned}
6a^2-15a-8a+20 &= 6\cdot a\cdot a-15\cdot a-8\cdot a+20 && [a^2=a\cdot a]\\
&= 2\cdot 3\cdot a\cdot a-3\cdot 5\cdot a-8\cdot a+20 && [6=2\cdot 3, 15=3\cdot 5]\\
&= 3a(2a-5)-2\cdot 4\cdot a+4\cdot 5 && [8=2\cdot 4, 20=4\cdot 5]\\
&= 3a(2a-5)-4(2a-5) && [\text{Since } a(b+c)=ab+ac]
\end{aligned}$$

$$= (3a-4)(2a-5) \qquad [\text{By distributive property}]$$

Therefore, the complete factorized form of $6a^2-15a-8a+20$ is $\boxed{(3a-4)(2a-5)}$

Answer 35PA.

Consider the polynomial $18x^2 - 30x - 3x + 5$

The objective is to factor the given polynomial.

For this, Group the common factors and use the distributive property

$$18x^2 - 30x - 3x + 5 = 18\cdot x\cdot x - 30\cdot x - 3\cdot x + 5 \quad [x^2 = x\cdot x]$$
$$= 2\cdot 9\cdot x\cdot x - 3\cdot 10\cdot x - 3\cdot x + 5 \quad [18 = 2\cdot 8, 30 = 3\cdot 10]$$
$$= 2\cdot 3\cdot 3\cdot x\cdot x - 3\cdot 10\cdot x - 3\cdot x + 5 \quad [9 = 3\cdot 3]$$
$$= 2\cdot 3\cdot 3\cdot x\cdot x - 3\cdot 2\cdot 5\cdot x - 3\cdot x + 5 \quad [10 = 2\cdot 5]$$
$$= 6x(3x-5) - 3\cdot x + 5 \quad [\text{Since } a(b+c) = ab + ac]$$
$$= 6x(3x-5) - 1(3x-5) \quad [\text{Since } a(b+c) = ab + ac]$$
$$= (6x-1)(3x-5) \quad [\text{By distributive property}]$$

Therefore, the complete factorized form of $18x^2 - 30x - 3x + 5$ is $\boxed{(6x-1)(3x-5)}$

Answer 36PA.

Consider the polynomial $4ax + 3ay + 4bx + 3by$

The objective is to factor the given polynomial.

For this, Group the common factors and use the distributive property

$$4ax + 3ay + 4bx + 3by = 4\cdot a\cdot x + 3\cdot a\cdot y + 4\cdot b\cdot x + 3\cdot b\cdot y$$
$$= 2\cdot 2\cdot a\cdot x + 3\cdot a\cdot y + 2\cdot 2\cdot b\cdot x + 3\cdot b\cdot y$$
$$[4 = 2\cdot 2]$$
$$= 2\cdot 2\cdot a\cdot x + 2\cdot 2\cdot b\cdot x + 3\cdot a\cdot y + 3\cdot b\cdot y$$
$$= 4x(a+b) + 3y(a+b)$$
$$[\text{Since } a(b+c) = ab + ac]$$
$$= (4x+3y)(a+b)$$
$$[\text{By distributive property}]$$

Therefore, the complete factorized form of $4ax + 3ay + 4bx + 3by$ is $\boxed{(4x+3y)(a+b)}$

Answer 37PA.

Consider the polynomial $2my+7x+7m+2xy$

The objective is to factor the given polynomial.

For this, Group the common factors and use the distributive property

$$\begin{aligned}2my+7x+7m+2xy &= 2\cdot m\cdot y+7\cdot x+7\cdot m+2\cdot x\cdot y\\ &= 2\cdot m\cdot y+7(x+m)+2\cdot x\cdot y \quad [\text{Since } a(b+c)=ab+ac]\\ &= 2\cdot m\cdot y+2\cdot x\cdot y+7(x+m)\end{aligned}$$

$$\begin{aligned}&= 2y(x+m)+7(x+m) \quad [\text{Since } a(b+c)=ab+ac]\\ &= (2y+7)(x+m) \quad [\text{By distributive property}]\end{aligned}$$

Therefore, the complete factorized form of $2my+7x+7m+2xy$ is $\boxed{(2y+7)(x+m)}$

Answer 38PA.

Consider the polynomial $8ax-6x-12a+9$

The objective is to factor the given polynomial

For this, group the common factors and use the distributive property

$$\begin{aligned}8ax-6x-12a+9 &= 8\cdot a\cdot x-6\cdot x-12\cdot a+9\\ &= 2\cdot 4\cdot a\cdot x-2\cdot 3\cdot x-2\cdot 6\cdot a+3\cdot 3 \quad \begin{bmatrix}8=2\cdot 4, 6=2\cdot 3,\\ 12=2\cdot 6, 9=3\cdot 3\end{bmatrix}\\ &= 2\cdot 2\cdot 2\cdot a\cdot x-2\cdot 3\cdot x-2\cdot 2\cdot 3\cdot a+3\cdot 3[4=2\cdot 2, 6=2\cdot 3]\\ &= 4a(2x-3)-2\cdot 3\cdot x+3\cdot 3 \quad [\text{Since } a(b+c)=ab+ac]\end{aligned}$$

$$\begin{aligned}&= 4a(2x-3)-3(2x-3) \quad [\text{Since } a(b+c)=ab+ac]\\ &= (4a-3)(2x-3) \quad [\text{by distributive property}]\end{aligned}$$

Therefore, the complete factored form of $8ax-6x-12a+9$ is $\boxed{(4a-3)(2x-3)}$

Answer 39PA.

Consider the polynomial $10x^2 - 14xy - 15x + 21y$

The objective is to factor the given polynomial.

For this group terms with common factors and use distributive property

The distributive property is $a(b+c) = ab + ac$

$$(b+c)a = ba + ca$$

$$\begin{aligned}
10x^2 - 14xy - 15x + 21y &= 2\cdot 5\cdot x\cdot x - 14xy - 15x + 21y && \begin{bmatrix} 10 = 2\cdot 5 \\ x^2 = x\cdot x \end{bmatrix} \\
&= 2\cdot 5\cdot x\cdot x - 2\cdot 7\cdot x\cdot y - 15x + 21y && [2\cdot 7 = 14] \\
&= 2x\cdot 5\cdot x - 2\cdot x\cdot 7y - 15x + 21y && [\text{Simplify}] \\
&= 2x(5x - 7y) - 15x + 21y && [\text{Use distributive}]
\end{aligned}$$

$$\begin{aligned}
&= 2x(5x-7y) - 1\cdot 3\cdot 5\cdot x + 3\cdot 7\cdot y && [3\cdot 5 = 15, 3\cdot 7 = 21] \\
&= 2x(5x-7y) + 3\cdot 7\cdot y - 1\cdot 3\cdot 5\cdot x && [\text{Simplify}] \\
&= 2x(5x-7y) + 3(7\cdot y - 1\cdot 5\cdot x) && [\text{By distributive}] \\
&= 2x(5x-7y) + 3(7y - 5x) && [\text{Simplify}] \\
&= 2x(5x-7y) + 3(-1(-7y) - 1\cdot 5x) && [\text{Since } -1\cdot -a = a] \\
&= 2x(5x-7y) - 3(-1)(-7y + 5x) && [\text{By distributive}] \\
&= 2x(5x-7y) - 3(5x - 7y) && [\text{Simplify}] \\
&= (2x-3)(5x-7y) && [\text{By distributive}]
\end{aligned}$$

Therefore, the complete factored form of $10x^2 - 14x - 15x + 21y$ is $\boxed{(2x-3)(5x-7y)}$

Answer 40PA.

Given that $\frac{1}{2}n^2 - \frac{3}{2}n$ is used to find the number of diagonals in a polygon with n sides.

The objective is the express the given polynomial in factored form.

For this first find the GCD of $\frac{1}{2}n^2$ and $-\frac{3}{2}n$

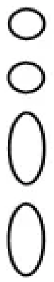
$$\frac{1}{2}n^2 = \frac{1}{2}\cdot n^2$$

$$= \frac{1}{2}\cdot n\cdot n \qquad [\text{Since } n\cdot n = n^2]$$

$$-\frac{3}{2}n = -1\cdot\frac{3}{2}n \qquad \left[\text{Since } \frac{3}{2} = -1\cdot\frac{3}{2}\right]$$

$$= 1\cdot\frac{1}{2}\cdot 3\cdot n \qquad \left[\frac{3}{2} = \frac{1}{2}\cdot 3\right]$$

GCD = Product of prime factors common to each factorization



$$\frac{1}{2}n^2 = \frac{1}{2}\cdot n\cdot n$$

$$-\frac{3}{2}n = -1\cdot\frac{1}{2}\cdot 3\cdot n$$

GCD $= \frac{1}{2}\cdot n$

$$= \frac{n}{2}$$

$$\frac{1}{2}n^2 - \frac{3}{2}n = \frac{1}{2}\cdot n\cdot n + (-1)\cdot 3\cdot\frac{1}{2}\cdot n \qquad [\text{Factored form}]$$

$$= \frac{n}{2}\cdot n + \frac{n}{2}(-3)$$

$$= \frac{n}{2}(n + (-3)) \qquad [\text{Since } a(b+c) = ab + ac]$$

$$= \frac{n}{2}(n-3)$$

Therefore, $\frac{1}{2}n^2 - \frac{3}{2}n$ in factored form is $\boxed{\frac{n}{2}\cdot(n-3)}$

Answer 41PA.

Given that $\frac{1}{2}n^2 - \frac{3}{2}n$ is used to find the number of diagonals in a polygon with n sides.

The objective is to find the number of diagonals in a decagon.

A decagon is a 10 sided polygon.

By substituting $n = 10$ sided polygon.

$$\frac{1}{2}n^2 - \frac{3}{2}n = \frac{1}{n}\cdot(10)^2 - \frac{3}{2}(10) \qquad [\text{put } n = 10]$$

$$= \frac{1}{2}\cdot 10\cdot 10 - \frac{3}{2}\cdot 10 \qquad [10^2 = 10\cdot 10]$$

$$= \frac{1}{2}\cdot 2\cdot 5\cdot 10 - \frac{3}{2}\cdot 2\cdot 5 \qquad [\text{Since } 10 = 2\cdot 5]$$

$$= 5\cdot 10 - 3\cdot 5 \qquad [\text{Simplify}]$$

$$= 50 - 15 \qquad [\text{Simplify}]$$

$$= 35$$

Therefore, the number of diagonals in a decagon are $\boxed{35}$

Answer 42PA.

Consider the equation $g = \frac{1}{2}n^2 - \frac{1}{2}n$

Where g represents the number of games needed for each term to play each other term exactly once.

n represents the number of terms.

The objective is to write the given equation in factored form.

For this first find the GCD of $\frac{1}{2}n^2, -\frac{1}{2}n$

$$\frac{1}{2}n^2 = \frac{1}{n}\cdot n\cdot n \qquad [\text{Since } n^2 = n\cdot n]$$

$$-\frac{1}{2}n = -1\cdot\frac{1}{2}\cdot n \qquad \left[\text{Since } -\frac{1}{2} = -1\cdot\frac{1}{2}\right]$$

GCD = Product of prime factors common to each factorization

$$\frac{1}{2}n^2 = \frac{1}{2}\cdot n\cdot n$$

$$-\frac{1}{2}n = -1\cdot\frac{1}{2}\cdot n$$

GCD = product of the common factor in each factorization

$$=\frac{1}{2}\cdot n$$

$$=\frac{1}{2}n$$

$$g=\frac{1}{2}n^2-\frac{1}{2}n$$

$$=\frac{1}{2}n^2+\left(-\frac{1}{2}n\right)$$

$$=\frac{1}{2}n\cdot n+\frac{1}{2}n\cdot(-1)$$

$$=\frac{1}{2}n\cdot n+\frac{1}{2}\cdot n(-1) \quad \text{[Simplify]}$$

$$=\frac{1}{2}n\left(n+(-1)\right) \quad \left[\text{Since } a(b+c)=ab+ac\right]$$

$$=\frac{1}{2}n(n-1)$$

$$=\frac{n}{2}(n-1)$$

Therefore, $g=\frac{1}{2}n^2-\frac{1}{2}n$ in factored form is $\boxed{g=\frac{n}{2}(n-1)}$

Answer 43PA.

Consider the equation $g=\frac{1}{2}n^2-\frac{1}{2}n$

Where *g* represents the number of games needed for each team to play each other team exactly once.

n represents the number of teams.

The objective is to find the number of games needed for 7 teams to play each other exactly 3 times.

$$\begin{aligned} g &= \frac{1}{2}n^2-\frac{1}{2}n \\ &= \frac{1}{2}7^2-\frac{1}{2}7 && [\text{put } n=7] \\ &= \frac{1}{2}\cdot 7\cdot 7-\frac{1}{2}\cdot 7 && [\text{Since } 7^2=7\cdot 7] \\ &= \frac{1}{2}(49-7) && [\text{Since } a(b+c)=ab+ac] \end{aligned}$$

$$\begin{aligned} &= \frac{1}{2}(42) \\ &= \frac{1}{2}\cdot 2\cdot 21 && [\text{Since } 42=2\cdot 2\cdot 1] \end{aligned}$$

21 games needed for 7 teams to play each other team exactly once.

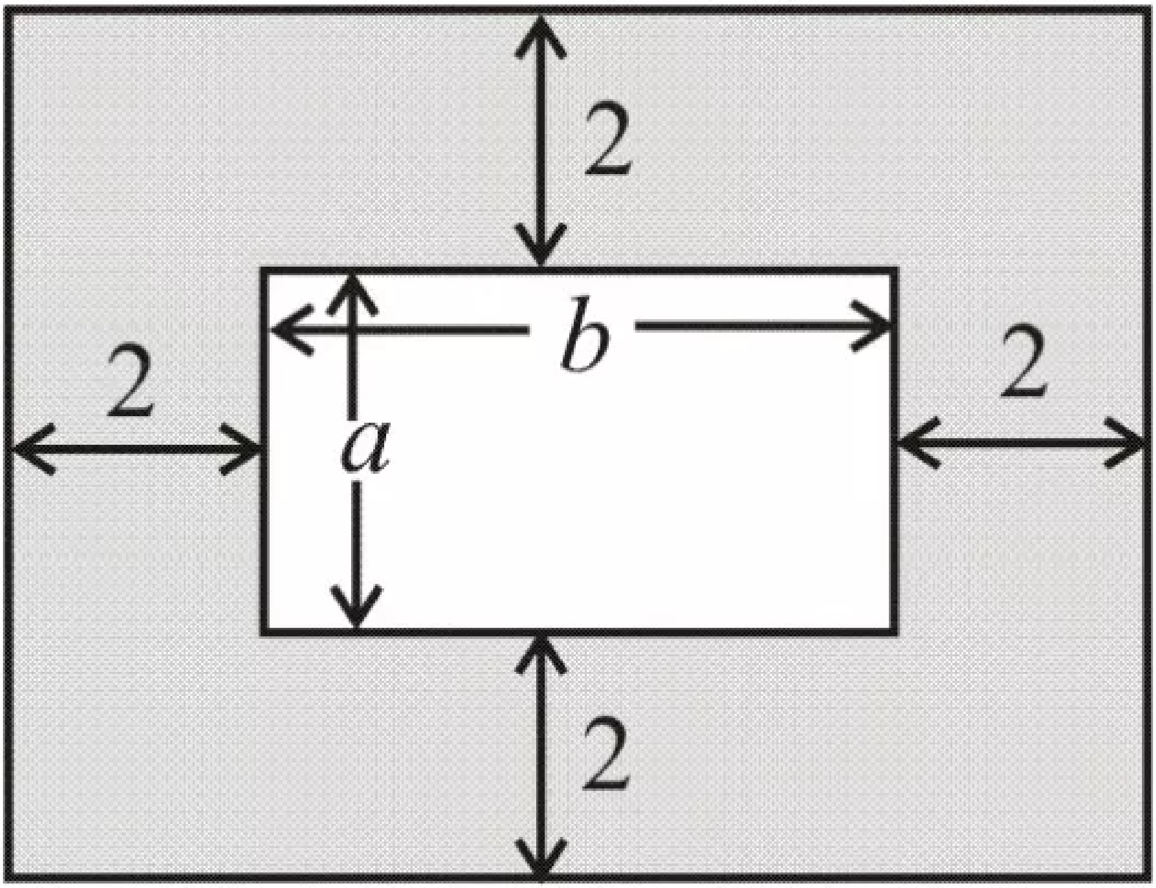
Number of games needed for 7 teams to play each other exactly 3 times

$$\begin{aligned} &= 3\cdot 21 \\ &= 63 \end{aligned}$$

63 games are needed for 7 teams to play each other exactly 3 times

Answer 44PA.

Consider the following figure



The objective is the express the area of shaded region in factored form.

Since Area of rectangle with length 'l' and breadth 'b' is

$$A = lb$$

For the inner rectangle, length $l = b$

Breadth $b = a$

Area of inner rectangle

$$A = lb$$
$$= ab \quad (l = b, b = a)$$

For the outer rectangle length l $= b + 2 + 2$

$= b + 4$

Breadth $b = a + 2 + 2$

$= a + 4$

Area of outer rectangle $= lb$

$= (b+4)(a+4)$

$= (b+4)a + (b+4)4$ [Since $a(b+c) = ab + ac$]

$= ba + 4a + 4b + 4\cdot 4$ [Since $(b+c)a = ba + ca$]

$= ab + 4a + 4b + 16$ [Simplify]

Area of shaded region = Area of outer rectangle – Area of inner rectangle

$= ab + 4a + 4b + 16 - ab$

$= 4a + 4b + 16$

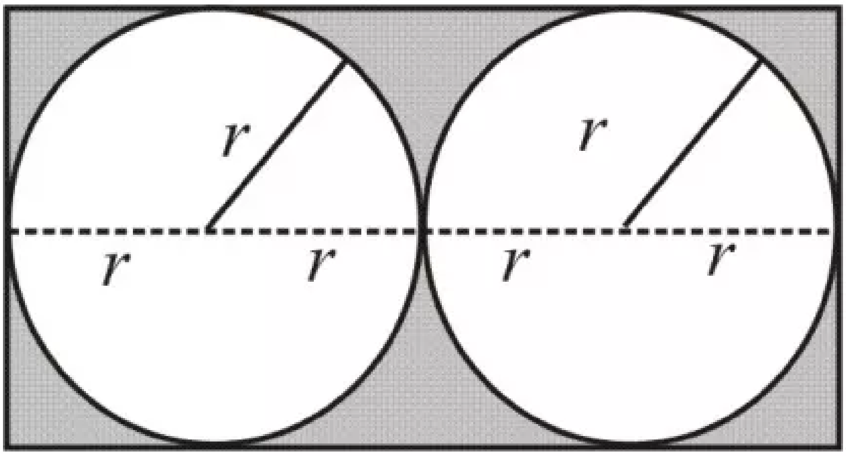
$= 4(a+b) + 4\cdot 4$ [$a(b+c) = ab + ac$]

$= 4(a+b+4)$

Area of shaded region in factored form is $\boxed{4(a+b+4)}$

Answer 45PA.

Consider the following figures



The objective is to express the shaded region in factored form.

Since area of circle with radius *r* is

$A = \pi r^2$

Area of two circles $= 2\cdot A = 2\pi r^2$

Since from the figure it is clear that *A* rectangle inscribed two circles.

Therefore, length of rectangle $= r + r + r + r$

$= 4r$

Breadth of rectangle $= r + r$

$= 2r$

Hence, Area of rectangle $= lb$

$= 4r \times 2r$ [$l = 4r, b = 2r$]

$= 8r^2$

Area of shaded region = Area rectangle – Area of two circles

$= 8r^2 - 2\pi r^2$

$= 2 \cdot 4 \cdot r^2 + (-1 \cdot 2 \cdot \pi \cdot r^2) \qquad [-2 = -1 \cdot 2]$

$= 2r^2 \cdot 4 + 2r^2(-1 \cdot \pi)$

$= 2r^2(4 + (-\pi)) \qquad \begin{bmatrix} -1 \cdot \pi = -\pi \text{ and} \\ a(b+c) = ab + ac \end{bmatrix}$

$= 2r^2(4 - \pi)$

Therefore, Area of shaded region in factored form is $\boxed{2r^2(4-\pi)}$

Answer 46PA.

Given that the perimeter of square is

$P = 12x + 20y$

The objective is to find an expression for area of a square since the perimeter of a square with side '*a*' is

$P = 4a$

Now express $P = 12x + 20y$ in 4*a* form

$P = 4 \cdot 3 \cdot x + 4 \cdot 5 \cdot y \qquad [12 = 4 \cdot 3, 20 = 4 \cdot 5]$

$= 4 \cdot 3x + 4(5y)$

$= 4(3x + 5y) \qquad \begin{bmatrix} \text{By distributive} \\ a(b+c) = ab + ac \end{bmatrix}$

$= 4a$

Here $a = 3x + 5y$

Also Area of square $A = a^2$

$= (3x + 5y)^2$

$= (3x + 5y)(3x + 5y)$

$= (3x + 5y)3x + (3x + 5y)5y \qquad [a(b+c) = ab + ac]$

$= 3x \cdot 3x + 5y \cdot 3x + 3 \cdot x \cdot 5y + 5y \cdot 5y \qquad [a(b+c) = ab + ac]$

$= 9x^2 + 15xy + 15xy + 25y^2 \qquad [\text{Simplify}]$

$= 9x^2 + 30xy + 25y^2 \qquad [\text{Combine like terms}]$

Therefore, the expression for area of square is $\boxed{9x^2 + 30xy + 25y^2}$

Answer 47PA.

Consider that the perimeter of a square

$P = 36a - 16b$

The objective is to find an expression for area of a square since the perimeter of a square with side '*a*' is

$P = 4a$

Now express $P = 36a - 16b$ in 4*a* form

$$
\begin{aligned}
P &= 36a - 16b \\
&= 4 \cdot 9a + (-1 \cdot 16 \cdot b) && [9 \cdot 4 = 36] \\
&= 4 \cdot 9a + -1 \cdot 4 \cdot 4 \cdot b && [-16 = -1 \cdot 16] \\
&= 4 \cdot 9a + 4(-1 \cdot 4 \cdot b) && [16 = 4 \cdot 4]
\end{aligned}
$$

$$
\begin{aligned}
&= 4 \cdot 9a + 4(-1 \cdot 4 \cdot b) \\
&= 4 \cdot 9a + 4 \cdot -4a \\
&= 4(9a + (-4b)) && [\text{By distributive } a(b+c) = ab + ac] \\
&= 4(9a - 4b)
\end{aligned}
$$

$= 4a$

Here $a = 9a - 4b$

Also Area of square

$$
\begin{aligned}
A &= a^2 \\
&= (9a - 4b)^2 && [a = 9a - 4b]
\end{aligned}
$$

$$
\begin{aligned}
&= (9a - 4b)(9a - 4b) && [a^2 = a \cdot a] \\
&= (9a - 4b)(9a + (-4b)) \\
&= (9a - 4b)9a + (9a - 4b)(-4b) && [a(b+c) = ab + ac] \\
&= (9a + (-4b))9a + (9a + (-4b))(-4b) && [-4b = +(-4b)] \\
&= 9a \cdot 9a + (-4b)9a + 9a \cdot (-4b) + (-4b)(-4b) && [a(b+c) = ab + ac] \\
&= 81a \cdot a - 36ab - 36ab + 16b \cdot b && [\text{Simplify}] \\
&= 81a^2 - 72ab + 16b^2
\end{aligned}
$$

Therefore, the expression for area of square is $\boxed{81a^2 - 72ab + 16b^2}$

Answer 48PA.

Consider the equation $x(x-24)=0$

The objective is to find the solution set of given equation.

By zero product property.

If $ab=0$ either $a=0 \text{ or } b=0$ or both.

$$x(x-24)=0$$
$$x=0 \text{ or } x-24=0 \qquad [\text{By zero product property}]$$

Now solve each equation.

$$x=0$$
$$x-24=0$$
$$x-24+24=0+24 \qquad [\text{Add 24 on each side}]$$
$$x=24 \qquad [\text{Simplify}]$$

The solution set is $\boxed{\{0,24\}}$

Check:

Substitute 0 and 24 for *x* in the given equation

$$x(x-24)=0$$
$$0(0-24)=0 \qquad [\text{put } x=0]$$
$$0(-24)=0 \qquad [\text{Simplify}]$$
$$0=0 \qquad [\text{True}]$$

$$x(x-24)=0$$
$$24(24-24)=0 \qquad [\text{Put } x=24]$$
$$24(0)=0 \qquad [24-24=0]$$
$$0=0 \quad \text{True}$$

Therefore, The solution set is $\{0,24\}$

Answer 49PA.

Consider the polynomial $a(a+16)=0$

The objective is to find the solution set of given equation.

By zero product property,

If $ab=0$ either $a=0$ (or) $b=0$ (or) both.

$$a(a+16)=0$$
$$a=0(\text{or})a+16=0 \quad [\text{By zero prodcut property}]$$

Now solve each equation

$$a=0$$
$$a+16=0$$
$$a+16-16=0-16 \quad [\text{Substract 16 on each side}]$$
$$a=-16 \quad [\text{Simplify}]$$

The solution set is $\boxed{\{0,-16\}}$

Check:

Substitute 0 and -16 for *x* in the given equation.

$$a(a+16)=0$$
$$0(0+16)=0 \quad [\text{put } a=0]$$
$$0(16)=0 \quad [\text{Simplify}]$$
$$0=0 \quad \text{True}$$
$$a(a+16)=0$$
$$-16(-16+16)=0 \quad [\text{Put } a=-16]$$
$$-16(0)=0 \quad [\text{Simplify}]$$
$$0=0 \quad \text{True}$$

The solution set is $\{0,-16\}$

Answer 50PA.

Consider the equation $(q+4)(3q-15)=0$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab=0$ either $a=0\ (\text{or})\ b=0$ (or) both

$$(q+4)(3q-15)=0$$
$$q+4=0\ (\text{or})\ 3q-15=0 \qquad [\text{By zero prodcut property}]$$

Now solve each equation

$$q+4=0$$
$$q+4-4=0-4 \qquad [\text{Substract 4 on each side}]$$
$$a=-4 \qquad [\text{Simplify}]$$

$$3q-15=0$$
$$3q-15+15=0+15 \qquad [\text{Add 15 on both side}]$$
$$3q=15 \qquad [\text{Simplify}]$$
$$\frac{3q}{3}=\frac{15}{3} \qquad [\text{divide with 3 on each side}]$$
$$q=5 \qquad [\text{Simplify}]$$

The solution set is $\boxed{\{-4,5\}}$

Check:

To check the proposed solution substitute than in the given equation

$$(q+4)(3q-15)=0$$
$$(-4+4)(3(-4)-15)=0 \qquad [\text{put } q=-4]$$
$$0(-12-15)=0 \qquad [\text{Simplify}]$$
$$0(-27)=0 \qquad [\text{Simplify}]$$

$0=0$ True

$$(q+4)(3q-15)=0$$
$$(5+4)(3(5)-15)=0 \qquad [\text{put } q=5]$$
$$9(15-15)=0 \qquad [\text{Simplify}]$$
$$9(0)=0 \qquad [\text{Simplify}]$$

$0=0$ True

The solution set is $\{-4,5\}$

Answer 51PA.

Consider the equation $(3y+9)(y-7)=0$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab=0$ either $a=0$ (or) $b=0$ (or) both

$$(3y+9)(y-7)=0$$
$$3y+9=0(\text{or})\, y-7=0 \qquad [\text{By zero prodcut property}]$$

Now solve each equation

$$3y+9=0$$
$$3y+9-9=0--9 \qquad [\text{Substract 49 on each side}]$$
$$3y=-9 \qquad [\text{Simplify}]$$
$$\frac{3y}{3}=-\frac{9}{3} \qquad [\text{Divide by 3 on both sides}]$$
$$y=-3 \qquad [\text{Simplify}]$$

Now

$$y-7=0$$
$$y-7+7=0+7 \qquad [\text{add 7 on both sides}]$$
$$y=7 \qquad [\text{Simplify}]$$

The solution set is $\boxed{\{-3,7\}}$

Check:

To check the proposed solution substitute than in the given equation

$$(3y+9)(y-7)=0$$

$$(3(-3)+9)(-3-7)=0 \qquad [\text{put } y=-3]$$

$$(-9+9)(-10)=0 \qquad [\text{Simplify}]$$

$$0(-10)=0 \qquad [\text{Simplify}]$$

$0=0$ True

$$(3y+9)(y-7)=0$$

$$(3y(7)+9)(7-7)=0 \qquad [\text{put } y=7]$$

$$(21+9)(0)=0 \qquad [\text{Simplify}]$$

$$30(0)=0 \qquad [\text{Simplify}]$$

$0=0$ True

The solution set is $\boxed{\{-3,7\}}$

Answer 52PA.

Consider the equation $(2b-3)(3b-8)=0$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab=0$ either $a=0\ (\text{or})\ b=0$ (or) both

$$(2b-3)(3b-8)=0$$
$$2b-3=0\ (\text{or})\ 3b-8=0 \qquad [\text{By zero prodcut property}]$$

Now solve each equation

$$2b-3=0$$
$$2b-3+3=0+3 \qquad [\text{Add 3 on each side}]$$
$$2b=3 \qquad [\text{Simplify}]$$
$$\frac{2b}{2}=\frac{3}{2} \qquad [\text{Divide by 2 on both sides}]$$
$$b=\frac{3}{2} \qquad [\text{Simplify}]$$

Now

$$3b-8=0$$
$$3b-8+8=0+8 \qquad [\text{add 8 on both sides}]$$
$$3b=8 \qquad [\text{Simplify}]$$
$$\frac{3b}{3}=\frac{8}{3} \qquad [\text{Divide by 3 on both sides}]$$
$$b=\frac{8}{3} \qquad [\text{Simplify}]$$

The solution set is $\boxed{\left\{\frac{3}{2},\frac{8}{3}\right\}}$

Check:

To check the proposed solution substitute than in the given equation

$$(2b-3)(3b-8)=0$$

$$\left(2\left(\frac{3}{2}\right)-3\right)\left(3\left(\frac{3}{2}\right)-8\right)=0 \qquad \left[\text{put } b=\frac{3}{2}\right]$$

$$(3-3)\left(\frac{9}{2}-8\right)=0 \qquad [\text{Simplify}]$$

$$0\left(\frac{9}{2}-8\right)=0 \qquad [\text{Simplify}]$$

$0=0$ True

$$(2b-3)(3b-8)=0$$

$$\left(2\left(\frac{8}{3}\right)-3\right)\left(3\left(\frac{8}{3}\right)-8\right)=0 \qquad \left[\text{put } b=\frac{8}{3}\right]$$

$$\left(\frac{16}{3}-3\right)(8-8)=0 \qquad [\text{Simplify}]$$

$$\left(\frac{16}{3}-3\right)(0)=0 \qquad [\text{Simplify}]$$

$0=0$ True

The solution set is $\boxed{\left\{\frac{3}{2},\frac{8}{3}\right\}}$

Answer 53PA.

Consider the equation $(4n+5)(3n-7)=0$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab=0$ either $a=0\ (\text{or})\ b=0$ (or) both

$$(4n+5)(3n-7)=0$$
$$4n+5=0\ (\text{or})\ 3n-7=0 \qquad [\text{By zero prodcut property}]$$

Now solve each equation

$$4n+5=0$$
$$4n+5-5=0-5 \qquad [\text{Substract 5 on each side}]$$
$$4n=-5 \qquad [\text{Simplify}]$$
$$\frac{4n}{4}=\frac{-5}{4} \qquad [\text{Divide by 4 on both sides}]$$
$$b=\frac{-5}{4} \qquad [\text{Simplify}]$$

Now

$$3n-7=0$$
$$3n-7+7=0+7 \qquad [\text{add 7 on both sides}]$$
$$3n=7 \qquad [\text{Simplify}]$$
$$\frac{3n}{3}=\frac{7}{3} \qquad [\text{Divide by 3 on both sides}]$$
$$n=\frac{7}{3} \qquad [\text{Simplify}]$$

The solution set is $\boxed{\left\{\frac{-5}{4},\frac{7}{3}\right\}}$

Check:

To check the proposed solution substitute than in the given equation

$$(4n+5)(3n-7)=0$$

$$\left(4\left(-\frac{5}{4}\right)+5\right)\left(3\left(-\frac{5}{4}\right)-7\right)=0 \qquad \left[\text{put } b=-\frac{5}{4}\right]$$

$$(-5+5)\left(\frac{-15}{4}-7\right)=0 \qquad [\text{Simplify}]$$

$$0\left(-\frac{15}{4}-7\right)=0 \qquad [\text{Simplify}]$$

$0=0$ True

$$(4n+5)(3n-7)=0$$

$$\left(4\left(\frac{7}{3}\right)+5\right)\left(3\left(\frac{7}{3}\right)-7\right)=0 \qquad \left[\text{put } n=\frac{7}{3}\right]$$

$$\left(\frac{28}{3}+5\right)(7-7)=0 \qquad [\text{Simplify}]$$

$$\left(\frac{28}{3}+5\right)(0)=0 \qquad [\text{Simplify}]$$

$0=0$ True

The solution set is $\boxed{\left\{\frac{-5}{4},\frac{7}{3}\right\}}$

Answer 54PA.

Consider the equation $3z^2+12z=0$

The objective is to find the solution set of given equation.

The zero product property is,

$3z^2+12z=0$

First write the given equation in the form $ab=0$

For this find the GCF of $3z^2, 12z$ and then factor it.

$$3z^2=3\cdot z\cdot z$$
$$12z=3\cdot 4\cdot z$$

GCF $=3\cdot z$

$$=3z$$

$$3z^2+12z=0$$
$$3z(z+4)=0 \qquad [\text{Factor the GCF of } 3z^2, 12z, \text{ that is } 3z]$$
$$3z=0 \text{ or } z+4=0$$

Now solve each equation

$$3z=0$$
$$\frac{3z}{3}=\frac{0}{3} \qquad [\text{Divide with 3 on each side}]$$
$$z=0 \qquad [\text{Simplify}]$$

$$z+4=0$$
$$z+4-4=0-4 \qquad [\text{Subtract 4 from each side}]$$
$$z=-4$$

The solution set is $\boxed{\{0,-4\}}$

Check:

To check the proposed solution substitute than in the given equation

$$3z^2+12z=0$$
$$3(0)^2+12(0)=0 \qquad [\text{put } z=0]$$
$$0+0=0 \qquad [\text{Simplify}]$$
$$0=0 \qquad \text{True}$$

$$3z^2+12z=0$$
$$3(-4)^2+12(-4)=0 \qquad [\text{put } z=-4]$$
$$3(16)+(-48)=0 \qquad [\text{Simplify}]$$
$$48-48=0 \qquad [\text{Simplify}]$$

$0=0$ True

The solution set is $\boxed{\{-4,0\}}$

Answer 55PA.

Consider the equation $7d^2 - 35d = 0$

The objective is to find the solution set of given equation.

The zero product property is,

$7d^2 - 35d = 0$

First write the given equation in the form $ab = 0$

For this find the GCF of $3z^2, 12z$ and then factor it.

$$7d^2 = 7 \cdot d \cdot d$$
$$-35d = 7 \cdot -5 \cdot d$$

GCF $= 7 \cdot d$

$= 7d$

$$7d^2 - 35d = 0$$
$$7d(d-5) = 0 \quad \left[\text{Factor the GCF of } 7d^2, 35d, \text{ that is } 7d\right]$$
$$7d = 0 \text{ or } d - 5 = 0$$

Now solve each equation

$$7d = 0$$
$$\frac{7d}{7} = \frac{0}{7} \quad [\text{Divide with 7 on each side}]$$
$$d = 0 \quad [\text{Simplify}]$$

$$d - 5 = 0$$
$$d - 5 + 5 = 0 + 5 \quad [\text{Add 5 from each side}]$$
$$d = 5$$

The solution set is $\boxed{\{0, 5\}}$

Check:

To check the proposed solution substitute than in the given equation

$$7d^2 - 35d = 0$$
$$7(0)^2 - 35(0) = 0 \quad [\text{put } d = 0]$$
$$0 - 0 = 0 \quad [\text{Simplify}]$$
$$0 = 0 \quad \text{True}$$

$$7d^2 - 35d = 0$$
$$7(5)^2 - 35(5) = 0 \quad [\text{put } d = 5]$$
$$7(25) - 35(5) = 0 \quad [\text{Simplify}]$$
$$175 - 175 = 0 \quad [\text{Simplify}]$$

$0 = 0$ True

The solution set is $\boxed{\{0, 5\}}$

Answer 56PA.

Consider the equation $2x^2 = 5x$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab = 0$ then $a = 0 \text{ or } b = 0$ or both

$$2x^2 = 5x$$

$$2x^2 - 5x = 5x - 5x \quad [\text{Subtract } 5x \text{ on both side}]$$

$$2x^2 - 5x = 0 \quad [\text{Simplify}]$$

Now write the above equation in the form $ab = 0$

For this find GCF of $2x^2, 5x$ and then factor it.

○

○

$$2x^2 = 2 \cdot x \cdot x$$

$$5x = 5 \cdot x$$

GFF = x

$$2x^2 - 5x = 0$$

$$x(2x-5) = 0$$

$$x = 0 \text{ or } 2x - 5 = 0 \quad [\text{By zero product property}]$$

Now solve each equation

$$x = 0,$$

$$2x - 5 = 0$$

$$2x - 5 + 5 = 0 + 5 \quad [\text{Add 5 on both side}]$$

$$2x = 5 \quad [\text{Simplify}]$$

$$\frac{2x}{2} = \frac{5}{2} \quad [\text{Divide with 2 on each side}]$$

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

The solution set is $\boxed{\left\{0, \frac{5}{2}\right\}}$

Check:

To check the proposed solution substitute than in the given equation

$$2x^2 = 5x$$

$$2(0)^2 = 5(0) \quad [\text{put } x = 0]$$

$$0 = 0 \quad \text{True}$$

$$2x^2 = 5x$$

$$2\left(\frac{5}{2}\right)^2 = 5x \quad \left[\text{put } x = \frac{5}{2}\right]$$

$$\frac{5}{2}\cdot\frac{5}{2} = 5\cdot\frac{5}{2} \quad \left[\text{Since } x^2 = x\cdot x\right]$$

$$5\cdot\frac{5}{2} = 5\cdot\frac{5}{2} \quad [\text{Simplify}]$$

$$\frac{25}{2} = \frac{25}{2} \text{ True}$$

The solution set is $\boxed{\left\{0, \frac{5}{2}\right\}}$

Answer 57PA.

Consider the equation $7x^2 = 6x$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab = 0$ then $a = 0 \text{ or } b = 0$ or both

$$\begin{aligned} 7x^2 &= 6x \\ 7x^2 - 6x &= 6x - 6x \qquad [\text{Subtract } 6x \text{ on both side}] \\ 7x^2 - 6x &= 0 \qquad [\text{Simplify}] \end{aligned}$$

Now write the above equation in the form $ab = 0$

For this find GCF of $7x^2, -6x$ and then factor it.

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$$7x^2 = 7 \cdot x \cdot x$$
$$-6x = -6 \cdot x$$

GFF = x

$$2x^2 - 5x = 0$$
$$x(2x - 5) = 0$$
$$x = 0 \text{ or } 2x - 5 = 0 \qquad [\text{By zero product property}]$$

Now solve each equation

$$x = 0,$$

$$\begin{aligned} 7x - 6 &= 0 \\ 7x - 6 + 6 &= 0 + 6 \qquad [\text{Add 6 on both side}] \\ 7x &= 6 \qquad [\text{Simplify}] \\ \frac{7x}{7} &= \frac{6}{7} \qquad [\text{Divide with 7 on each side}] \end{aligned}$$

$$x = \frac{6}{7}$$

The solution set is $\boxed{\left\{0, \frac{6}{7}\right\}}$

Check:

To check the proposed solution substitute than in the given equation

$$7x^2 = 6x$$

$$7(0)^2 = 6(0) \quad [\text{put } x = 0]$$

$$0 = 0 \quad \text{True}$$

$$7x^2 = 6x$$

$$7\left(\frac{6}{7}\right)^2 = 5\left(\frac{6}{7}\right) \quad \left[\text{put } x = \frac{6}{7}\right]$$

$$7\left(\frac{36}{49}\right) = \frac{36}{7} \quad [\text{Simplify}]$$

$$\frac{36}{7} = \frac{36}{7} \text{True} \quad \left[\frac{7}{49} = \frac{1}{7}\right]$$

The solution set is $\boxed{\left\{0, \frac{6}{7}\right\}}$

Answer 58PA.

Consider the equation $6x^2 = -4x$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab = 0$ then $a = 0 \text{ or } b = 0$ or both

$$6x^2 = -4x$$

$$6x^2 + 4x = -4x + 4x \quad [\text{Subtract } 4x \text{ on both side}]$$

$$6x^2 + 4x = 0 \quad [\text{Simplify}]$$

Now write the above equation in the form $ab = 0$

For this find GCF of $6x^2, 4x$ and then factor it.

○

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○

$$6x^2 = 6 \cdot x \cdot x$$

$$= 2 \cdot 3 \cdot x \cdot x$$

$$4x = 4 \cdot x$$

$$= 2 \cdot 2 \cdot x$$

GFF $= 2x$

$$6x^2 + 4x = 0$$

$$2x(3x + 2) = 0$$

$$2x = 0 (\text{or}) 3x + 2 = 0 \quad [\text{By zero product property}]$$

Now solve each equation

$$2x = 0$$

$$\frac{2x}{2} = \frac{0}{2} \quad \text{[Divide with 2 on each side]}$$

$$x = 0$$

$$3x + 2 = 0$$

$$3x + 2 - 2 = 0 - 2 \quad \text{[Substract 2 on both sides]}$$

$$3x = -2$$

$$\frac{3x}{3} = -\frac{2}{3} \quad \text{[Divide with 3 on both sides]}$$

$$x = \frac{-2}{3}$$

The solution set is $\boxed{\left\{0, \frac{-2}{3}\right\}}$

Check:

To check the proposed solution substitute than in the given equation

$$6x^2 = -4x$$

$$6(0)^2 = -4(0) \quad [\text{put } x = 0]$$

$$0 = 0 \quad \text{True}$$

$$6x^2 = -4x$$

$$6\left(-\frac{2}{3}\right)^2 = -4\left(-\frac{2}{3}\right) \quad \left[\text{put } x = -\frac{2}{3}\right]$$

$$6\left(\frac{4}{9}\right) = \frac{8}{3} \quad \text{[Simplify]}$$

$$\frac{(2 \times \not{3})(4)}{3 \times \not{3}} = \frac{8}{3} \quad \text{[Simplify]}$$

$$\frac{8}{3} = \frac{8}{3} \quad \text{True}$$

The solution set is $\boxed{\left\{0, \frac{-2}{3}\right\}}$

Answer 59PA.

Consider the equation $20x^2 = -15x$

The objective is to find the solution set of given equation.

The zero product property is,

If $ab = 0$ then $a = 0 \text{ or } b = 0$ or both

$$20x^2 = -15x$$

$$20x^2 + 15x = -15x + 15x \qquad [\text{Subtract } 15x \text{ on both side}]$$

$$20x^2 + 15x = 0 \qquad [\text{Simplify}]$$

Now write the above equation in the form $ab = 0$

For this find GCF of $20x^2, 15x$ and then factor it.

$$20x^2 = 2 \cdot 2 \cdot 5 \cdot x \cdot x$$

$$15 = 3 \cdot 5 \cdot x$$

GFF $= 5x$

$$20x^2 + 15x = 0$$

$$5x(4x + 3) = 0$$

$$5x = 0 (\text{or}) 4x + 3 = 0 \quad [\text{By zero product property}]$$

Now solve each equation

$$5x = 0$$

$$\frac{5x}{5} = \frac{0}{5} \qquad [\text{Divide with 5 on each side}]$$

$$x = 0$$

$$4x + 3 = 0$$

$$4x + 3 - 3 = 0 - 3 \qquad [\text{Substract 3 on both sides}]$$

$$4x = -3$$

$$\frac{4x}{4} = -\frac{3}{4} \qquad [\text{Divide with 4 on both sides}]$$

$$x = \frac{-3}{4}$$

The solution set is $\boxed{\left\{0, \frac{-3}{4}\right\}}$

Check:

To check the proposed solution substitute than in the given equation

$$20x^2 = -15x$$
$$20(0)^2 = -15(0) \qquad [\text{put } x = 0]$$
$$0 = 0 \qquad \text{True}$$

$$20x^2 = -15x$$
$$20\left(-\frac{3}{4}\right)^2 = -15\left(-\frac{3}{4}\right) \qquad \left[\text{put } x = -\frac{3}{4}\right]$$
$$20\left(\frac{-3}{4}\right) = \frac{45}{4} \qquad [\text{Simplify}]$$
$$\frac{(2\times \not{2})(5)(9)}{(\not{2})(2)(4)} = \frac{45}{4} \qquad [\text{Simplify}]$$
$$\frac{45}{4} = \frac{45}{4} \qquad \text{True}$$

The solution set is $\boxed{\left\{0, \frac{-3}{4}\right\}}$

Answer 60PA.

In a pool at a water park, a dolphin jumps out of the water travelling at 20 feet per second.

Its height *h*, in feet, above the water after *t* seconds is given by the formula $h = 20t - 16t^2$

The objective is to find the time taken the dolphin in the air before, it returning to the water.

When the dolphin returns to the water $h = 0$

$$20t - 16t^2 = h$$
$$20t - 16t^2 = 0 \qquad [h = 0]$$
$$4\cdot 5t - 4\cdot 4t \cdot t = 0$$
$$4t(5 - 4t) = 0$$

By zero product property if $ab = 0$ then $a = 0$ or $b = 0$ or both

$$4t = 0 \text{ or } 5 - 4t = 0$$
$$\frac{4t}{4} = \frac{0}{4} \qquad [\text{Divide with 4 on both sides}]$$
$$5 - 4t = 0$$
$$5 - 4t + 4t = 0 + 4t \qquad [\text{Divide with 4 on both sides}]$$
$$t = \frac{5}{4}$$
$$t = 1.25$$

The solution set is $\{0, 1.25\}$

Here $t = 0$ represents the initially the dolphin in the water before, it jumps.

Thus the dolphin returns to water after $\boxed{1.25 \text{ Second}}$

Answer 61PA.

The Mallk popped a ball straight up with an initial upward velocity of 45 feet per second.

The height *h* in feet, of the ball above the ground is modeled by the equation $h = 2 + 45t - 16t^2$

The objective is to find the time taken that the ball in the air if the catcher catches the ball when it is 2 feet above the ground.

That is when $h = 2$, find *t*

$$h = 2 + 45t - 16t^2$$
$$2 = 2 + 45t - 16t^2 \qquad [h = 2]$$
$$2 - 2 = 2 + 45t - 16t^2 - 2 \qquad [\text{Subtract 2 on both sides}]$$
$$0 = 45t - 16t^2$$
$$45t - 16t^2 = 0$$
$$t(45 - 16t) = 0$$

By zero product property if $ab = 0$ then $a = 0 \text{ or } b = 0$ or both

$$t = 0 \text{ or } 45 - 16t = 0$$
$$45 - 16t = 0$$
$$45 - 16t + 16t = 16t \qquad [\text{Add 16t on both sides}]$$
$$45 = 16t$$
$$\frac{45}{16} = \frac{16t}{16} \qquad [\text{Divide with 16 on both sides}]$$
$$2.8125 = t$$

That is it takes about $\boxed{2.8 \text{ seconds}}$ that the catcher catches the ball.

Answer 62PA.

Consider the expression $a^{x+y} + a^x b^y - a^y b^x - b^{x+y}$

The objective is factor the given expression completely.

Since $a^{m+n} = a^m \cdot a^n$

$$a^y b^x - b^{x+y} = a^x \cdot a^y + a^x \cdot a^y + a^x b^y - a^y b^x - b^x b^y \qquad [\text{by above property}]$$
$$= a^x\left(a^y + b^y\right) - a^y b^x - b^x b^y \qquad [a(b+c) = ab + ac]$$
$$= a^x\left(a^y + b^y\right) + (-1)b^x a^y + (-1)b^x b^y \qquad [-a^y = (-1)a^y]$$
$$= a^x\left(a^y + b^y\right) + b^x(-1)a^y + b^x(-1)b^y \qquad [\text{Simplify}]$$
$$= a^x\left(a^y + b^y\right) + \left(-b^x\right)\left(a^y + b^y\right) \qquad [a(b+c) = -ab + ac]$$
$$= \left(a^x + \left(-b^x\right)\right)\left(a^y + b^y\right) \qquad [(b+c)a = ba + ca]$$
$$= \left(a^x - b^x\right)\left(a^y + b^y\right)$$

Therefore, the factored form of given expressions $\boxed{\left(a^x - b^x\right)\left(a^y + b^y\right)}$

Answer 63PA.

Nolan Ryan, the greatest strikeout pitcher in the history of base ball, had a fast ball clocked at 98 miles per hour or about 151 feet per second.

And he throw a ball directly upward with the same velocity, the height *h* of the ball in feet above the point at which he x released it could be modeled by the formula $h = 151t - 16t^2$

Where *t* is the time in seconds

The objective is to find the time taken by the ball would remain in the air before returning to his glove.

When the returning into the glove $h = 0$

$$151t - 16t^2 = h$$

$$151t - 16t^2 = 0 \qquad [h = 0]$$

$$151t - 16 \cdot t \cdot t = 0$$

$$t(151 - 16t) = 0 \qquad \left[\text{Factor GCF } \left(151t, 16t^2\right) = t\right]$$

The zero product property is if $ab = 0$ then $a = 0 \text{ or } b = 0$ or both

$$t = 0 \text{ or } 151 - 16t = 0$$

$$151 - 16t = 0$$

$$151 - 16t + 16t = 0 + 16t \qquad [\text{Add } 16t \text{ on both sides}]$$

$$151 = 16t$$

$$\frac{151}{16} = \frac{16t}{16} \qquad [\text{Divide with 16 on both sides}]$$

$$t = \frac{151}{16} \qquad [\text{Approx}]$$

$$= 9.44$$

Thus the solution $t = 0$ represents the point at which the ball was initially thrown into the air.

And $\boxed{t \approx 9.44 \text{ sec}}$ represents, that the time taken after the ball was thrown for it to return to the same height at which it was thrown.

Answer 65PA.

Lola is batting for her school's softball team

She hit the ball straight up with an initial upward velocity of 47 feet per second.

Also the height *h* of the softball in feet above ground after *t* seconds can be modeled by the equation $h = 16t^2 + 47t + 3$

The objective is to find the time that the softball in the air before it hit the ground.

At the time of hitting the ground height $h = 0$

Thus $h = -16t^2 + 47t + 3$

$$0 = -16t^2 + 47t + 3 \quad [h = 0]$$

$$-1[16t^2 - 47t - 3] = 0 \quad [\text{Take } -1 \text{ as factor}]$$

$$16t^2 - 47t - 3 = 0 \quad [\text{Since } -1 \neq 0]$$

$$16t^2 - 48t + t - 3 = 0$$

$$16(t-3) + 1(t-3) = 0$$

$$(t-3)(16t+1) = 0 \quad [\text{By distributive } (b+c)a = ba + ca]$$

By zero product property if $ab = 0$ then $a = 0 \text{ or } b = 0$ or both

$$t - 3 = 0 \text{ or } 16t + 1 = 0$$

$$t - 3 = 0$$

$$t - 3 + 3 = 0 + 3 \quad [\text{Add 3 on both sides}]$$

$$t = 3$$

$$16t + 1 = 0$$

$$16t + 1 - 1 = 0 - 1 \quad [\text{Subtract 1 on both sides}]$$

$$16t = -1$$

$$\frac{16t}{16} = \frac{-1}{16} \quad [\text{Divide with 16 on both sides}]$$

$$t = \frac{-1}{16}$$

Since time *t* is not in negative.

Therefore, $t = 3$

The time taken to hit the ground is $\boxed{3 \text{ Seconds}}$

Answer 66MYS.

Consider the number 123

The objective is to find the factors of 123 and classify whether it is prime or composite.

For this first list all pairs of whole numbers whose product is 123.

Those are

$$1 \times 123 = 123$$
$$3 \times 41 = 123$$

The factors are the whole numbers whose product is 123.

The factors are 1,2,41 and 123.

A whole number, greater than 1, that has more than two factors is called a composite number.

123 is a composite number, because

123 has four factors.

Therefore, factors of 123 are 1, 3, 41, 123.

123 is a composite number.

Answer 67MYS.

Consider the number 300

The objective is to find the factors of 300 and classify whether it is prime or composite.

For this first list all pairs of whole numbers whose product is 123.

Those are

$$1\times 300=300$$
$$2\times 150=300$$
$$3\times 100=300$$
$$6\times 50=300$$
$$4\times 75=300$$
$$5\times 60=300$$
$$10\times 30=300$$
$$15\times 25=300$$
$$12\times 25=300$$

The factors are the whole numbers whose product is 300.

The factors are 1 $1,2,3,4,5,6,10,15,12,20,25,30,50,60,75,100,150$ and 300.

A whole number greater than 1, that has more than two factors is called a composite number.

Since 3000 has 18 factors

300 is a composite number.

Therefore, factors of 3000 are $1,2,3,4,5,6,10,12,15,20,25,30,50,60,75,100,150$ and 300

$\boxed{300}$ is a composite number.

Answer 68MYS.

Consider the number 67

The objective is to find the factors of 67 and classify whether it is prime or composite.

For this first list all pairs of whole numbers whose product is 67.

Those are

$1 \times 67 = 67$

The factors are 1, 67.

A whole number greater than 1, that has more than two factors is called a composite number.

67 has only two factors 1 and itself.

It is a prime number.

Therefore, the factors of 67 are 1,67.

$\boxed{67}$ is a prime number.

Answer 69MYS.

Consider the expression $(4s^3+3)^2$

The objective is to find the above product

$$\begin{aligned}(4s^3+3)^2 &= (4s^3+3)(4s^3+3) && [a^2 = a \cdot a] \\ &= (4s^3+3)4s^2 + (4s^3+3)3 && [\text{By distributive } a(b+c) = ab+ac] \\ &= 4s^2 \cdot 4s^2 + 2 \cdot 4s^3 + 4s^3 \cdot 3 + 2 \cdot 3 && [\text{By distributive } a(b+c) = ab+ac] \\ &= 4 \cdot 4 \cdot s^3 \cdot s^3 + 12s^3 + 12s^3 + 9 && [\text{Simplify}]\end{aligned}$$

$$= 16s^6 + 24s^3 + 9 \qquad [\text{Simplify}]$$

Therefore, $\boxed{(4s^3+3)^2 = 16s^6 + 24s^3 + 9}$

Answer 70MYS.

Consider the expression $(2p+5q)(2p-5q)$

The objective is to find the above product since $(a+b)(a-b)=a^2-b^2$

Here $a=2p, b=5q$

$$
\begin{aligned}
(2p+5q)(2p-5q) &= (2p)^2-(5q)^2 \\
&= 2^2\cdot p^2-5^2\cdot q^2 \qquad \left[(ab)^n=a^n\cdot b^n\right] \\
&= 4p^2-25q^2 \qquad [\text{Simplify}]
\end{aligned}
$$

Therefore, $\boxed{(2p+5q)(2p-5q)=4p^2-25q^2}$

Answer 71MYS.

Consider the expression is $(3k+8)(3k+8)$

The objective is to find the above product

Since $a\cdot a=a^2$

$$(3k+8)(3k+8)=(3k+8)^2$$

Since $(a+b)^2=a^2+2ab+b^2$

Here $a=3k, b=8$

$$
\begin{aligned}
(3k+8)(3k+8) &= (3k+8)^2 \\
&= (3k)^2+2\cdot 3\cdot k\cdot 8+8^2 \\
&= 3^2\cdot k^2+48k+64 \qquad \left[\text{Since } (ab)^n=a^n\cdot b^n\right] \\
&= 9k^2+48k+64
\end{aligned}
$$

Therefore, $(3k+8)(3k+8)=\boxed{9k^2+48k+64}$

Answer 72MYS.

Consider the expression $\frac{s^4}{s^{-7}}$

The objective is to find the above product

$$\frac{s^4}{s^{-7}} = \frac{s^4}{\frac{1}{s^7}} \qquad \left[\text{Since; } a^{-n} = \frac{1}{a^n}\right]$$

$$= s^4 \cdot \frac{s^7}{1} \qquad \left[\text{Since; } \frac{1}{\frac{1}{a^n}} = \frac{a^n}{1}\right]$$

$$= s^4 \cdot s^7$$

$$= s^{4+7} \qquad \left[\text{Since } a^m \cdot a^n = a^{m+n}\right]$$

$$= s^{11}$$

Therefore, $\boxed{\frac{s^4}{s^{-7}} = s^{11}}$

Answer 73MYS.

Consider the expression $\frac{18x^3y^{-1}}{12x^2y^4}$

The objective is to simplify the given expression.

Since $\frac{a^m}{a^n} = a^{m-n} \quad (m > n)$

$$\frac{1}{a^n} = a^{-n}$$

$$a^m \cdot a^n = a^{m+n}$$

$$\frac{18x^3y^{-1}}{12x^2y^4} = \frac{18x^3 \cdot \frac{1}{y}}{12x^2y^4} \text{ (Because } a^{-n} = \frac{1}{a^n}\text{)}$$

$$= \frac{18 \cdot x^3}{12x^2 \cdot y^4 y} \text{ (Simplify)}$$

$$= \frac{6 \cdot 3 \cdot x^3}{6 \cdot 2 \cdot x^2 \cdot y^{4+1}} \text{ (Because } a^m \cdot a^n = a^{m+n}\text{)}$$

$$= \frac{3 \cdot x^3}{2 \cdot x^2 \cdot y^5} \text{ (Simplify)}$$

$$= \frac{3 \cdot x^{3-2}}{2 \cdot y^5} \text{ (Because } \frac{a^m}{a^n} = a^{m-n}\text{)}$$

$$= \frac{3x}{2y^5}$$

Therefore,

$$\boxed{\frac{18x^3y^{-1}}{12x^2y^4} = \frac{3x}{2y^5}}.$$

Answer 74MYS.

Consider the expression $\dfrac{34p^7q^2r^{-5}}{17\cdot\left(p^3qr^{-1}\right)^2}$

The objective is to simplify the given expression.

$$\frac{34p^7q^2r^{-5}}{17\cdot\left(p^3qr^{-1}\right)^2}=\frac{34p^7q^2r^{-5}}{17\left(p^3\right)^2\cdot q^2\cdot\left(r^{-1}\right)^2}$$ (Because $(abc)^n=a^n\cdot b^n\cdot c^n$)

$$=\frac{17\cdot 2p^7\cdot q^2r^{-5}}{17\cdot p^6\cdot q^2r^{-2}}$$ (Because $\left(a^m\right)^n=a^{mn}$)

$$=2\cdot\frac{p^7}{p^6}\cdot\frac{q^2}{q^2}\cdot\frac{r^{-5}}{r^{-2}}$$ (Simplify)

$$=2p^{7-6}\cdot q^{2-2}r^{-5-(-2)}$$ (Because $\dfrac{a^m}{a^n}=a^{m-n}$)

$$=2pq^0\cdot r^{-5+2}$$ (Simplify)

$$=2\cdot p\cdot 1\cdot r^{-3}$$ (Because $q^0=1$)

$$=2\cdot p\cdot\frac{1}{r^3}$$ (Because $a^{-n}=\dfrac{1}{a^n}$)

$$=\frac{2p}{r^3}$$

Therefore,

$$\boxed{\frac{34p^7q^2r^{-5}}{17\left(p^3qr^{-1}\right)^2}=\frac{2p}{r^3}}.$$

Answer 75MYS.

Michael uses at most 60% of his annual Flynn Co stock dividend to purchases more shares of Flynn Co stock.

Last year dividend of Michel is $ 885

Flynn Co stock cost per 1 share = $14

The objective is to find the greatest number of shares that Michael can purchase

For this first find 60% of $ 885

Since *x*% of 885 is $\frac{x}{100} \times 885$

60% of $885 $= \frac{x}{100} \times 885$

$$= \frac{6}{10} \cdot 885$$
$$= \frac{6}{2} \cdot 177$$
$$= 3.177$$
$$= \$531$$

Michael invest $ 531 to purchase shares in shares in Flynn Co stock

Greatest number of shares that he purchased is

Amount invested divided by cost of one share

$$= 531 \div 14$$
$$= 37.92$$

That is he can purchase maximum 37 shares.

Michael can purchase $\boxed{37 \text{ shares}}$

Answer 76MYS.

Consider the expression $(n+8)(n+3)$

The objective is to find the given product

Since the distributive property is

$$a(b+c)=ab+ac$$
$$(b+c)a=ba+ca$$

$(n+8)(n+3)=(n+8)n+(n+8)3$ (Since $a(b+c)=ab+ac$)

$=n\cdot n+8\cdot n+n\cdot 3+8\cdot 3$ (By distributive $(b+c)a=ba+ca$)

$=n^2+8n+3n+24$ (Since $n\cdot n=n^2, 8\cdot 3=24$)

$=n^2+11n+24$ (Combine like terms)

Therefore,

$$\boxed{(n+8)(n+3)=n^2+11n+24}.$$

Answer 77MYS.

Consider the expression $(x-4)(x-5)$

The objective is to find the given product

Since the distributive property is

$$a(b+c)=ab+ac$$
$$(b+c)a=ba+ca$$

$(x-4)(x-5)=(x+(-4))(x+(-5))$ (Because $-a=+(-a)$)

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

(By distributive)

$=x\cdot x+x\cdot(-5)+(-4)\cdot x+(-4)\cdot(-5)$

(By distributive)

$=x^2-5x-4x+(-4)(-5)$ (Since)

$=x^2-5x-4x+20$ (Because $(-a)\cdot(-b)=ab$)

$=x^2-9x+20$ (Combine like terms)

Therefore,

$$\boxed{(x-4)(x-5)=x^2-9x+20}.$$

Answer 78MYS.

Consider the expression $(b-10)(b+7)$

The objective is to find the given product

Since the distributive property is

$$a(b+c)=ab+ac$$
$$(b+c)a=ba+ca$$

$(b-10)(b+7)=(b-10)\cdot b+(b-10)\cdot 7$ (By distributive)

$=(b+(-10))\cdot b\cdot(b+(-10))\cdot 7$

(Since $(a-b)=a+(-b)$)

$=b\cdot b+(-10)\cdot n+b\cdot 7+(-10)\cdot 7$

(By distributive property)

$=b^2-10b+7\cdot b-70$ (Simplify)

$=b^2-3b-70$ (Combine like terms)

Therefore,

$\boxed{(b-10)(b+7)=b^2-3b-70}$.

Answer 79MYS.

Consider the expression $(3a+1)(6a-4)$

The objective is to find the given product

Since the distributive property is

$$a(b+c)=ab+ac$$
$$(b+c)a=ba+ca$$

$(3a+1)(6a-4)=(3a+1)(6a+(-4))$ (Since $a-b=a+(-b)$)

$=(3a+1)6a+(3a+1)(-4)$

(By distributive)

$=3a\cdot 6a+1\cdot 6a+3a\cdot(-4)+1\cdot(-4)$

(By distributive)

$=3\cdot 6\cdot a\cdot a+6a+(-4)3\cdot a-4$

(Simplify)

$=18a^2+6a-12a-4$ (Because $a^2=a\cdot a$)

$=18a^2-6a-4$ (Combine like terms)

Therefore,

$\boxed{(3a+1)(6a-4)=18a^2-6a-4}$.

Answer 80MYS.

Consider the expression $(5p-2)(9p-3)$

The objective is to find the given product.

Since the distributive properties are

$$a(b+c)=ab+ac$$
$$(b+c)a=ba+ca$$

$$(5p-2)(9p-3)=(5p+(-2))(9p+(-3))$$

(Since $a-b=a+(-b)$)

$$=(5p+(-2))9p+(5p+(-2))(-3)$$

(By distributive property)

$$=5p\cdot 9p+(-2)\cdot 9p+5p\cdot(-3)+(-2)\cdot(-3)$$

(By distributive property)

$$=5\cdot 9\cdot p\cdot p+-2\cdot 9\cdot p+5\cdot -3\cdot p+6$$

(Because $-a\cdot -b=ab$)

$$=45p\cdot p+(-18)p+(-15)p+6$$

(Simplify)

$$=45p^2-18p-15p+6$$

(Since $p\cdot p=p^2$)

$=45p^2-33p+6$ (Combine like terms)

Therefore,

$$\boxed{(5p-2)(9p-3) = 45p^2-33p+6}$$

Answer 81MYS.

Consider the expression $(2y-5)(4y+3)$

The objective is to find the given product.

Since the distributive properties are

$$a(b+c)=ab+ac$$
$$(b+c)a=ba+ca$$

$$(2y-5)(4y+3)=(2y-5)\cdot 4y+(2y-5)\cdot 3$$

(By distributive property)

$$=(2y+(-5))\cdot 4y+(2y+(-5))\cdot 3$$

(Since $a-b=a+(-b)$)

$$=2y\cdot 4y+(-5)\cdot 4y+2y\cdot 3+(-5)\cdot 3$$

(By distributive property)

$$=2\cdot 4\cdot y\cdot y+(-20)y+23\cdot y+(-15)$$

(Simplify)

$$=8y\cdot y-20y+6y-15$$

(Simplify)

$$=8y^2-20y+6y-15$$

(Since $y\cdot y=y^2$)

$$=8y^2-14y-15$$ (Combine like terms)

Therefore,

$$\boxed{(2y-5)(4y+3)=8y^2-14y-15}$$