Chapter 8. Polynomials

Ex. 8.8

Answer 1CU.

The square of a sum is to add two numbers and then take the square of the sum. That is

if *a* and *b* are two integers then their square given $(a+b)^2 = a^2 + b^2 + 2ab$

The square of the difference is to subtract the two numbers and then take the square of the difference. That is if *a* and *b* are two integers then their square of the their difference is given by $(a-b)^2 = a^2 + b^2 - 2ab$.

So one can say that in square of the sum of two numbers the squares of the numbers are added and to that sum 2 times the product of the numbers is added

While in square of the difference of two numbers the squares of the numbers are added and to that sum 2 times the product of the numbers is subtracted.

Answer 2CU.

The square of the difference is to subtract the two numbers and then take the square of the difference. That is if *a* and *b* are two integers then their square of the their difference is given by $(a-b)^2 = a^2 + b^2 - 2ab$.

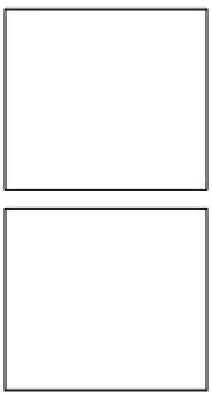
While the difference of squares is simple difference of the numbers that is for two numbers a and b the difference of squares is given by $a^2 - b^2$.

So in the square of the difference the squares of the numbers are added and then to that sum 2 times the product of the numbers is subtracted.

While in difference of squares the simple subtraction is to be done.

Answer 3CU.

To model the product of $(x-3)$ and $(x-3)$ that is $(x-3)^2$. Draw a square tile with length of each side equal to $(x-3)$. Then the area of the tile is the product of $(x-3)$ and $(x-3)$ that is $(x-3)^2$, As shown



$x - 3$

Answer 4CU.

Binomials whose product is a difference of squares are $(x-3)$ and $(x+3)$. As

$$\begin{aligned}(x-3)(x+3) &= x\cdot x + x\cdot 3 - 3\cdot x - 3\cdot 3 && \text{use FOIL}\\ &= x^2 - 3^2 && \text{simplify}\end{aligned}$$

Thus two binomials whose product is a difference of squares.

Answer 5CU.

To find the product use the square of sum formula which states that for any two numbers *x* and *y*, then $(x+y)^2 = x^2 + y^2 + 2xy$

Now use $x = a$, and $y = 6$ gives

$$\begin{aligned}(a+6)^2 &= a^2 + 6^2 + 2a\cdot 6\\ &= a^2 + 12a + 36 && \text{simplify}\end{aligned}$$

Thus $\boxed{(a+6)^2 = a^2 + 12a + 36}$

Answer 6CU.

Since the given product can be written as $(4n-3)(4n-3) = (4n-3)^2$.

Use the square of difference formula to find the product, the square of difference states that for any two numbers *x* and *y*, then $(x-y)^2 = x^2 + y^2 - 2xy$

Now use $x = 4n$, and $y = 3$ gives

$$\begin{aligned}(4n-3)^2 &= (4n)^2 + 3^2 - 2(4n)\cdot 3\\ &= 16n^2 - 24n + 9 && \text{simplify}\end{aligned}$$

Thus $\boxed{(4n-3)^2 = 16n^2 - 24n + 9}$

Answer 7CU.

To find the given product note that the first binomial is the difference of 8*x* and 5 and the second binomial is the sum of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$\begin{aligned}(8x-5)(8x+5) &= (8x)^2 - (5)^2\\ &= 64x^2 - 25 && \text{simplify}\end{aligned}$$

Thus $\boxed{(8x-5)(8x+5) = 64x^2 - 25}$

Answer 8CU.

To find the given product note that the first binomial is the sum of 3*a* and 7*b* and the second binomial is the difference of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$(3a+7b)(3a-7b)=(3a)^2-(7b)^2$$
$$=9a^2-49b^2 \qquad \text{simplify}$$

Thus $\boxed{(3a+7b)(3a-7b)=9a^2-49b^2}$

Answer 9CU.

To find the given product use the square of difference formula which states that for any two numbers *a* and *b*, then $(a-b)^2=a^2+b^2-2ab$

Now use $a=x^2$, and $b=6y$ gives

$$(x^2-6y)^2=(x^2)^2+(6y)^2-2(x^2)\cdot(6y)$$
$$=x^4-12x^2y+36y^2 \qquad \text{simplify}$$

Thus $\boxed{(x^2-6y)^2=x^4-12x^2y+36y^2}$

Answer 10CU.

To find the given product use the square of difference formula which states that for any two numbers *a* and *b*, then $(a-b)^2=a^2+b^2-2ab$

Now use $a=9$, and $b=p$ gives

$$(9-p)^2=(9)^2+(p)^2-2(9)\cdot(p)$$
$$=p^2-18p+81 \qquad \text{simplify}$$

Thus $\boxed{(9-p)^2=p^2-18p+81}$

Answer 11CU.

When a purebred cinnamon male is mated with a purebred golden female, then the hamster pups can have pure golden coloring GG, or golden cinnamon coloring Gg, and pure cinnamon coloring gg. The combination can be shown in the square table.

GG	Gg
gG	gg

Each parent has half the genes necessary for Golden color and half the genes necessary for Cinnamon color. So the makeup of each parent can be modeled by $0.5G+0.5g$. So the expression for the genetic makeup of the hamster pup is given product of $0.5G+0.5g$ and $0.5G+0.5g$ that is $(0.5G+0.5g)^2$.

Now to write $(0.5G+0.5g)^2$ in the simplest form use the square sum formula which states that $(a+b)^2=a^2+b^2+2ab$, for any a and b.

Now use $a=0.5G$, and $b=0.5g$ gives

$$\begin{aligned}(0.5G+0.5g)^2 &= (0.5G)^2+(0.5g)^2+2(0.5G)\cdot(0.5g)\\ &= 0.25G^2+0.25g^2+0.5Gg \qquad \text{simplify}\\ &= 0.25GG+0.25gg+0.5Gg\end{aligned}$$

So the expression for genetic makeup of hamster pups is $\boxed{0.25GG+0.25gg+0.5Gg}$

Answer 12CU.

The expression for genetic makeup of hamster pups is $0.25GG+0.25gg+0.5Gg$, so 25% of the pups will have pure golden color, 25% of the pups will have pure cinnamon color, and 50% of pups will have golden cinnamon color.

Hence the probability the pups will have cinnamon coloring is $\boxed{25\% \text{ or } \frac{1}{4}}$

Answer 13PA.

To find the product use the square of sum formula which states that for any two numbers p and q, then $(p+q)^2=p^2+q^2+2pq$

Now use $p=y$, and $q=4$ gives

$$\begin{aligned}(y+4)^2 &= y^2+4^2+2y\cdot 4\\ &= y^2+8y+16 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(y+4)^2=y^2+8y+16}$

Answer 14PA.

Since the given product can be written as $(k+8)(k+8)=(k+8)^2$.

To find the product use the square of sum formula which states that for any two numbers *p* and *q*, then $(p+q)^2 = p^2+q^2+2pq$

Now use $p=k, \text{and } q=8$ gives

$$\begin{aligned}(k+8)^2 &= k^2+8^2+2(k)\cdot(8)\\ &= k^2+16k+64 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(k+8)(k+8)=k^2+16k+64}$

Answer 15PA.

Since the given product can be written as $(a-5)(a-5)=(a-5)^2$.

To find the product use the square of difference formula which states that for any two numbers *p* and *q*, then $(p-q)^2 = p^2+q^2-2pq$

Now use $p=a, \text{and } q=5$ gives

$$\begin{aligned}(a-5)^2 &= a^2+5^2-2(a)\cdot(5)\\ &= a^2-10a+25 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(a-5)(a-5)=a^2-10a+25}$

Answer 16PA.

To find the given product use the square of difference formula which states that for any two numbers *p* and *q*, then $(p-q)^2 = p^2+q^2-2pq$

Now use $p=n, \text{and } q=12$ gives

$$\begin{aligned}(n-12)^2 &= n^2+(12)^2-2(n)\cdot(12)\\ &= n^2-24n+144 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(n-12)^2=n^2-24n+144}$

Answer 17PA.

To find the given product note that the first binomial is the sum of b and 7 and the second binomial is the difference of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$(b+7)(b-7)=(b)^2-(7)^2$$
$$=b^2-49 \quad \text{simplify}$$

Thus $\boxed{(b+7)(b-7)=b^2-49}$

Answer 18PA.

To find the given product note that the first binomial is the difference of c and 2 and the second binomial is the sum of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$(c-2)(c+2)=(c)^2-(2)^2$$
$$=c^2-4 \quad \text{simplify}$$

Thus $\boxed{(c-2)(c+2)=c^2-4}$

Answer 19PA.

To find the product use the square of sum formula which states that for any two numbers p and q, then $(p+q)^2=p^2+q^2+2pq$

Now use $p=2g$, and $q=5$ gives

$$(2g+5)^2=(2g)^2+5^2+2(2g)\cdot 5$$
$$=4g^2+20g+25 \quad \text{simplify}$$

Thus $\boxed{(2g+5)^2=4g^2+20g+25}$

Answer 20PA.

To find the product use the square of sum formula which states that for any two numbers p and q, then $(p+q)^2=p^2+q^2+2pq$

Now use $p=9x$, and $q=3$ gives

$$(9x+3)^2=(9x)^2+3^2+2(9x)\cdot 3$$
$$=81x^2+54x+9 \quad \text{simplify}$$

Thus $\boxed{(9x+3)^2=81x^2+54x+9}$

Answer 21PA.

To find the given product use the square of difference formula which states that for any two numbers *p* and *q*, then $(p-q)^2 = p^2+q^2-2pq$

Now use $p=7, \text{and } q=4y$ gives

$$\begin{aligned}(7-4y)^2 &= 7^2+(4y)^2-2(7)\cdot(4y)\\ &= 16y^2-42y+49 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(7-4y)^2 = 16y^2-42y+49}$

Answer 22PA.

To find the given product use the square of difference formula which states that for any two numbers *p* and *q*, then $(p-q)^2 = p^2+q^2-2pq$

Now use $p=4, \text{and } q=6h$ gives

$$\begin{aligned}(4-6h)^2 &= 4^2+(6h)^2-2(4)\cdot(6h)\\ &= 36h^2-48h+16 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(4-6h)^2 = 36h^2-48h+16}$

Answer 23PA.

To find the given product note that the first binomial is the sum of 11*r* and 8 and the second binomial is the sum of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$\begin{aligned}(11r+8)(11r-8) &= (11r)^2-(8)^2\\ &= 121r^2-64 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(11r+8)(11r-8) = 121r^2-64}$

Answer 24PA.

To find the given product note that the first binomial is the difference of 12*p* and 3 and the second binomial is the sum of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$\begin{aligned}(12p-3)(12p+3) &= (12p)^2-(3)^2\\ &= 144p^2-9 \qquad \text{simplify}\end{aligned}$$

Thus $\boxed{(12p-3)(12p+3) = 144p^2-9}$

Answer 25PA.

To find the product use the square of sum formula which states that for any two numbers p and q, then $(p+q)^2 = p^2 + q^2 + 2pq$

Now use $p = a$, and $q = 5b$ gives

$$(a+5b)^2 = a^2 + (5b)^2 + 2(a)\cdot(5b)$$
$$= a^2 + 25b^2 + 10ab \qquad \text{simplify}$$

Thus $\boxed{(a+5b)^2 = a^2 + 25b^2 + 10ab}$

Answer 26PA.

To find the product use the square of sum formula which states that for any two numbers p and q, then $(p+q)^2 = p^2 + q^2 + 2pq$

Now use $p = m$, and $q = 7n$ gives

$$(m+7n)^2 = m^2 + (7n)^2 + 2(m)\cdot(7n)$$
$$= m^2 + 49n^2 + 14mn \qquad \text{simplify}$$

Thus $\boxed{(m+7n)^2 = m^2 + 49n^2 + 14mn}$

Answer 27PA.

To find the product use the square of difference formula which states that for any two numbers p and q, then $(p-q)^2 = p^2 + q^2 - 2pq$

Now use $p = 2x$, and $q = 9y$ gives

$$(2x-9y)^2 = (2x)^2 + (9y)^2 - 2(2x)\cdot(9y)$$
$$= 4x^2 + 81y^2 - 36xy \qquad \text{simplify}$$

Thus $\boxed{(2x-9y)^2 = 4x^2 + 81y^2 - 36xy}$

Answer 28PA.

To find the product use the square of difference formula which states that for any two numbers p and q, then $(p-q)^2 = p^2 + q^2 - 2pq$

Now use $p = 3n$, and $q = 10p$ gives

$$(3n-10p)^2 = (3n)^2 + (10p)^2 - 2(3n)\cdot(10p)$$
$$= 9n^2 + 100p^2 - 60np \qquad \text{simplify}$$

Thus $\boxed{(3n-10p)^2 = 9n^2 + 100p^2 - 60np}$

Answer 30PA.

To find the given product note that the first binomial is the difference of $4d$ and 13 and the second binomial is the sum of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$(4d-13)(4d+13)=(4d)^2-(13)^2$$
$$=16d^2-169 \quad \text{simplify}$$

Thus $\boxed{(4d-13)(4d+13)=16d^2-169}$

Answer 31PA.

To find the product use the square of sum formula which states that for any two numbers p and q, then $(p+q)^2=p^2+q^2+2pq$

Now use $p=x^3$, and $q=4y$ gives

$$(x^3+4y)^2=(x^3)^2+(4y)^2+2(x^3)\cdot(4y)$$
$$=x^6+16y^2+8x^3y \quad \text{simplify } (a^n)^m=a^{mn}$$

Thus $\boxed{(x^3+4y)^2=x^6+16y^2+8x^3y}$

Answer 32PA.

To find the product use the square of difference formula which states that for any two numbers p and q, then $(p-q)^2=p^2+q^2-2pq$

Now use $p=3a^2$, and $q=b^2$ gives

$$(3a^2-b^2)^2=(3a^2)^2+(b^2)^2-2(3a^2)\cdot(b^2)$$
$$=9a^4+b^4-6a^2b^2 \quad \text{simplify } (a^n)^m=a^{mn}$$

Thus $\boxed{(3a^2-b^2)^2=9a^4+b^4-6a^2b^2}$

Answer 33PA.

To find the given product note that the first binomial is the difference of $8a^2$ and $9b^3$ and the second binomial is the sum of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$(8a^2-9b^3)(8a^2+9b^3)=(8a^2)^2-(9b^3)^2$$
$$=64(a^2)^2-81(b^3)^2 \quad \text{as } (xy)^m=x^my^m$$
$$=64a^4-81b^6 \quad \text{simplify the exponents}$$

Thus $\boxed{(8a^2-9b^3)(8a^2+9b^3)=64a^4-81b^6}$

Answer 34PA.

To find the given product note that the first binomial is the difference of $5x^4$ and y and the second binomial is the sum of same numbers. Since the product of sum and difference of two numbers is equal to the difference of their squares so

$$\begin{aligned}(5x^4-y)(5x^4+y) &= (5x^4)^2-(y)^2 \\ &= 25(x^4)^2-y^2 \quad \text{as } (xy)^m = x^m y^m \\ &= 25x^8-y^2 \quad \text{simplify the exponents}\end{aligned}$$

Thus $\boxed{(5x^4-y)(5x^4+y)=25x^8-y^2}$

Answer 35PA.

To find the product use the square of difference formula which states that for any two numbers p and q, then $(p-q)^2 = p^2+q^2-2pq$

Now use $p=\frac{2}{3}x$, and $q=6$ gives

$$\begin{aligned}\left(\frac{2}{3}x-6\right)^2 &= \left(\frac{2}{3}x\right)^2+(6)^2-2\left(\frac{2}{3}x\right)\cdot(6) \\ &= \left(\frac{2}{3}\right)^2 x^2-8x+36 \quad \text{simplify use } (ab)^m = a^m b^m \\ &= \frac{4}{9}x^2-8x+36\end{aligned}$$

Thus $\boxed{\left(\frac{2}{3}x-6\right)^2 = \frac{4}{9}x^2-8x+36}$

Answer 36PA.

To find the product use the square of sum formula which states that for any two numbers p and q, then $(p+q)^2 = p^2+q^2+2pq$

Now use $p=\frac{4}{5}x$, and $q=10$ gives

$$\begin{aligned}\left(\frac{4}{5}x+10\right)^2 &= \left(\frac{4}{5}x\right)^2+(10)^2+2\left(\frac{4}{5}x\right)\cdot(10) \\ &= \left(\frac{4}{5}\right)^2 x^2+16x+100 \quad \text{simplify use } (ab)^m = a^m b^m \\ &= \frac{16}{25}x^2+16x+100\end{aligned}$$

Thus $\boxed{\left(\frac{4}{5}x+10\right)^2 = \frac{16}{25}x^2+16x+100}$

Answer 37PA.

In the given product there are three binomials $2n+1, 2n-1, \text{and } n+5$. To find the product first multiply the first two binomials and to the result multiply the third binomial as shown

Now since $(p+q)(p-q)=p^2-q^2$, thus

$$\begin{aligned}(2n+1)(2n-1)&=(2n)^2-1^2 && p=2n, q=1\\ &=4n^2-1 && \text{simplify}\end{aligned}$$

Hence $(2n+1)(2n-1)(n+5)=(4n^2-1)(n+5)$.

Now

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

Thus $\boxed{(2n+1)(2n-1)(n+5)=4n^3+4n^2-n-1}$

Answer 38PA.

In the given product there are four binomials $p+3, p-4, p-3 \text{ and } p+4$. To find the product first rearrange the binomials as shown

$(p+3)(p-4)(p-3)(p+4)=(p+3)(p-3)(p-4)(p+4)$, which can be done as multiplication of binomials can be dine in any order

Now since $(x+y)(x-y)=x^2-y^2$, for any x and y thus

$$\begin{aligned}(p+3)(p-3)&=(p)^2-3^2 && x=p, y=3\\ &=p^2-9 && \text{simplify}\end{aligned}$$

And

$$\begin{aligned}(p-4)(p+4)&=(p)^2-4^2 && x=p, y=4\\ &=p^2-16 && \text{simplify}\end{aligned}$$

Hence $(p+3)(p-3)(p-4)(p+4)=(p^2-9)(p^2-16)$.

Now

$$\begin{aligned}(p^2-9)(p^2-16)&=(p^2)(p^2)-(p^2)\cdot(16)+(9)\cdot(p^2)+(9)\cdot(16) && \text{use FOIL}\\ &=p^4-16p^2+9p^2+144 && \text{simplify}\\ &=p^4-7p^2+144\end{aligned}$$

Thus $\boxed{(p+3)(p-4)(p-3)(p+4)=p^4-7p^2+144}$

Answer 39PA.

The children's of Pam and Bob can have brown eyes that is they have the BB or Bb gene, or they can have blue eyes then they will have bb gene. The combination of the genes can be shown in the square table.

BB Brown eyes	Bb Brown eyes
bB Brown eyes	bb Blue eyes

Each parent has half the genes necessary for brown eyes and half the genes necessary for blue eyes. So the makeup of each parent can be modeled by $0.5B+0.5b$. So the expression for the genetic makeup of the hamster pup is given product of $0.5B+0.5b$ and $0.5B+0.5b$ that is $(0.5B+0.5b)^2$.

Now to write $(0.5B+0.5b)^2$ in the simplest form use the square sum formula which states that $(a+b)^2=a^2+b^2+2ab$, for any a and b.

Now use $a=0.5B, \text{ and } b=0.5b$ gives

$$\begin{aligned}(0.5B+0.5b)^2 &= (0.5B)^2+(0.5b)^2+2(0.5B)\cdot(0.5b) \\ &= 0.25B^2+0.25b^2+0.5Bb \qquad \text{simplify} \\ &= 0.25BB+0.25bb+0.5Bb\end{aligned}$$

So the expression for genetic makeup of Pam and Bob's children is $\boxed{0.25BB+0.25bb+0.5Bb}$

Answer 40PA.

Since a child would have blue eyes if it has bb gene. As the expression for genetic makeup of Pam and Bob's children is $0.25BB+0.25bb+0.5Bb$. So 25% of the children's of Pam and Bob have blue eyes. In other words *probability of blue eyes is* $\frac{1}{4}$.

Answer 41PA.

Let us choose the odd number 3,

Then its square is $3^2 = 9$.

Now two times 3 is $2(3) = 6$. Now add square of 3 and twice of 3 gives

$$\begin{aligned} 3^2 + 2(3) &= 9 + 6 \\ &= 15 \end{aligned}$$

Now add 1 to the above sum gives the value as 16.

Now square root of the result is $\sqrt{16} = 4$.

Subtract 3 from 4 gives $4 - 3 = 1$.

Thus the result is 1.

Answer 42PA.

Let the odd number chosen be *a*,

Then its square is a^2.

Now two times *a* is 2*a*.

Now add square of *a* and twice of *a* gives the polynomial as $a^2 + 2a$

Now add 1 to the above sum $a^2 + 2a$ gives the

Polynomial as $\boxed{a^2 + 2a + 1}$

Answer 43PA.

The Polynomial which represents Julie's first three steps is $a^2 + 2a + 1$.

Since by the square of sum formula for any two numbers *x* and *y* $(x + y)^2 = x^2 + y^2 + 2xy$

comparing the above formula with the square of sum gives $a^2 + 2a + 1 = (a + 1)^2$

Hence the polynomial $a^2 + 2a + 1$ is the square of $\boxed{a + 1}$.

Answer 44PA.

The perfect square obtained above is $a^2 + 2a + 1 = (a + 1)^2$.

Taking the square root gives $\sqrt{(a + 1)^2} = a + 1$.

Now subtract *a* from this gives the result $a + 1 - a = 1$.

Hence the result is 1.

Answer 45PA.

It is given that the radius of the stage is *s* meters. Also each seating level is 1 meter wide.

So the radius of the first seating level is $s+1$, the radius of the second seating level is $(s+1)+1=s+2$, and the radius of the third seating level is $(s+2)+1=s+3$

Thus the radii of second and third levels is $\boxed{(s+2)\text{ m, and }(s+3)\text{ m}}$ respectively.

Answer 46PA.

It is given that the radius of the stage is *s* meters. Also each seating level is 1 meter wide.

So the radius of the first seating level is $s+1$, the radius of the second seating level is $(s+1)+1=s+2$, and the radius of the third seating level is $(s+2)+1=s+3$.

So the radius of the third seating level is $s+3$ m.

Now the area of the shaded region is equal to difference between the areas of the third level and second level.

Now as the levels area circular with known radii. And area of circle with radius *r* is given by πr^2.

Thus area of third seating level with radius $s+3$ m is $\pi(s+3)^2$

And the area of second seating level with radius $s+2$ m is $\pi(s+2)^2$.

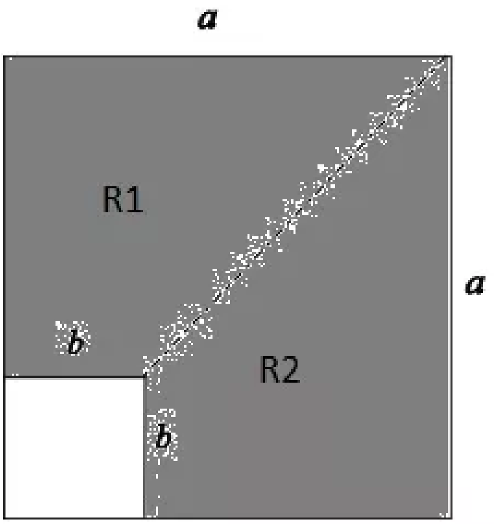
Now the difference between the area of the third and second seating level gives the shaded area, now the difference is

$$\begin{aligned}
&\pi(s+3)^2-\pi(s+2)^2 \\
&=\pi\left[(s+3)^2-(s+2)^2\right] && \text{take common factor out} \\
&=\pi\left[(s+3)+(s+2)\right]\left[(s+3)-(s+2)\right] && \text{as } (a+b)(a-b)=a^2-b^2 \\
&=\pi(2s+5)(1) && \text{simplify each term in the parenthesis}
\end{aligned}$$

Thus the area of the shaded region is $\boxed{(2s+5)\pi\text{ m}^2}$ respectively.

Answer 47PA.

Divide the region into two trapezoid R1 and R2 as shown



For the trapezoid R1 length of parallel sides is *a* and *b* and height is *a–b*. for the trapezoid R2 length of parallel sides is *a* and *b* and height is *a–b*.

Now area of trapezoid R1 is given by

$$A = \frac{1}{2}(\text{sum of parallel sides length})(\text{height})$$
$$= \frac{1}{2}(a+b)(a-b)$$

Since the lengths of parallel sides and height of trapezoid R2 is same as that of R1. So area of R2 is also $\frac{1}{2}(a+b)(a-b)$.

Total area shaded is sum of two area

$$\frac{1}{2}(a+b)(a-b)+\frac{1}{2}(a+b)(a-b)$$
$$=(a+b)(a-b) \qquad \text{as } \frac{1}{2}+\frac{1}{2}=1$$

So the shaded area is also given by the product $(a+b)(a-b)$

Answer 48PA.

The product of two binomials is also a binomial if the one binomial is the sum (or difference) of two terms and the other binomial is difference (or sum) of same two terms.

For example consider the two binomials $(x-y)$ and $(x+y)$, then

$$\begin{aligned}(x-y)(x+y) &= x\cdot x + x\cdot y - y\cdot x - y\cdot y \\ &= x^2 + xy - xy - y^2 \quad \text{as } xy = yx \\ &= x^2 - y^2 \quad \text{simplify}\end{aligned}$$

But if the two binomials are not like the above then the product is not a binomial.

For example consider the two binomials $(x-1)$ and $(x+2)$, then

$$\begin{aligned}(x-y)(x+y) &= x\cdot x + x\cdot 2 - 1\cdot x - 1\cdot 2 \\ &= x^2 + 2x - x - 2 \\ &= x^2 + x - 2 \quad \text{simplify}\end{aligned}$$

Which is a trinomial.

Answer 49PA.

By the square of difference formula $(a-b)^2 = a^2 + b^2 - 2ab$, use the given values

$a^2 + b^2 = 40, \quad ab = 12$, gives

$$\begin{aligned}(a-b)^2 &= a^2 + b^2 - 2ab \\ &= (40) - 2(12) \quad \text{substitute the given values} \\ &= 40 - 24 \\ &= 16 \quad \text{simplify}\end{aligned}$$

So $(a-b)^2 = 16$.

So option C is correct.

Answer 50PA.

By the product of sum and difference of two terms formula $x^2 - y^2 = (x+y)(x-y)$, use the given values

$x + y = 20, \quad x - y = 10$, gives

$$\begin{aligned} x^2 - y^2 &= (x+y)(x-y) \\ &= (20)(10) && \text{substitute the given values} \\ &= 200 && \text{simplify} \end{aligned}$$

So $x^2 - y^2 = 200$,

So option B is correct.

Answer 51PA.

To find out whether there is any pattern for $(a+b)^3$,

a) To find the product $(a+b)(a+b)(a+b)$ proceed in the following way

$$\begin{aligned} &(a+b)(a+b)(a+b) \\ &= (a+b)(a+b)^2 \\ &= (a+b)(a^2 + b^2 + 2ab) && \text{use the square of sum formulla} \\ &= a \cdot a^2 + a \cdot b^2 + a \cdot 2ab + b \cdot a^2 + b \cdot b^2 + b \cdot 2ab \end{aligned}$$

Simply the different terms gives

$$\begin{aligned} &(a+b)(a+b)(a+b) \\ &= a^3 + ab^2 + 2a^2b + a^2b + b^3 + 2ab^2 \\ &= a^3 + b^3 + 3a^2b + 3ab^2 && \text{add like terms} \end{aligned}$$

Thus $\boxed{(a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2}$

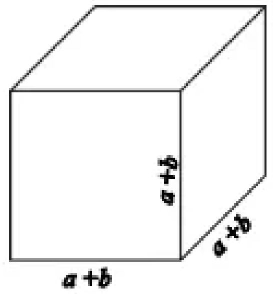
b) To find the value of $(x+2)^3$, use the pattern for the cube of sum that is

$(a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$, put $a = x, b = 2$ gives

$$\begin{aligned} (x+2)^3 &= x^3 + 2^3 + 3x^2(2) + 3x(2)^2 \\ &= x^3 + 6x^2 + 12x + 8 && \text{rearanging terms} \end{aligned}$$

Thus $\boxed{(x+2)^3 = x^3 + 6x^2 + 12x + 8}$

c) The geometrical diagram which represents the cube of sum is a box with each edge of length $a+b$.



Answer 52MYS.

To find product use the FOIL method as shown

$$
\begin{aligned}
(x+2)(x+7) &= x\cdot x + x\cdot 7 + 2\cdot x + 2\cdot 7 \\
&= x^2 + 7x + 2x + 14 \\
&= x^2 + 9x + 14 \qquad \text{add like terms}
\end{aligned}
$$

Thus $\boxed{(x+2)(x+7) = x^2 + 9x + 14}$

Answer 53MYS.

To find product use the FOIL method as shown

$$
\begin{aligned}
(c-9)(c+3) &= c\cdot c + c\cdot 3 - 9\cdot c - 9\cdot 3 \\
&= c^2 + 3c - 9c - 27 \\
&= c^2 - 6c - 27 \qquad \text{subtract like terms}
\end{aligned}
$$

Thus $\boxed{(c-9)(c+3) = c^2 - 6c - 27}$

Answer 54MYA.

To find product use the FOIL method as shown

$$
\begin{aligned}
(4y-1)(5y-6) &= 4y\cdot 5y + 4y\cdot(-6) - 1\cdot 5y - 1\cdot(-6) \\
&= 20y^2 - 24y - 5y + 6 \\
&= 20y^2 - 29y + 6 \qquad \text{add like terms}
\end{aligned}
$$

Thus $\boxed{(4y-1)(5y-6) = 20y^2 - 29y + 6}$

Answer 55MYS.

To find product use the FOIL method as shown

$$\begin{aligned}(4y-1)(5y-6) &= 3n\cdot 8n + 3n\cdot(5) - 5\cdot 8n - 5\cdot 5 \\ &= 24n^2 + 15n - 40n - 25 \\ &= 24n^2 - 25n - 25 \qquad \text{subtract like terms}\end{aligned}$$

Thus $\boxed{(4y-1)(5y-6) = 24n^2 - 25n - 25}$

Answer 56MYS.

To find product each term of the binomial is multiplied to each term of the trinomial and then like terms are added or subtracted shown

$$\begin{aligned}&(x-2)(3x^2-5x+4) \\ &= x\cdot 3x^2 + x\cdot(-5x) + x\cdot 4 - 2\cdot 3x^2 - 2\cdot(-5x) - 2\cdot 4 \\ &= 3x^3 - 5x^2 + 4x - 6x^2 + 10x - 8 \qquad \text{simplify eac term} \\ &= 3x^3 - 11x^2 + 14x - 8 \qquad \text{add and subtract like terms}\end{aligned}$$

Thus $\boxed{(x-2)(3x^2-5x+4) = 3x^3 - 11x^2 + 14x - 8}$

Answer 57MYS.

To find product each term of the binomial is multiplied to each term of the trinomial and then like terms are added or subtracted shown

$$\begin{aligned}&(2k+5)(2k^2-8k+7) \\ &= 2k\cdot 2k^2 + 2k\cdot(-8k) + 2k\cdot 7 + 5\cdot 2k^2 + 5\cdot(-8k) + 5\cdot 7 \\ &= 4k^3 - 16k^2 + 14k + 10k^2 - 40k + 35 \qquad \text{simplify each term} \\ &= 4k^3 - 6k^2 - 36k + 35 \qquad \text{add and subtract like terms}\end{aligned}$$

Thus $\boxed{(2k+5)(2k^2-8k+7) = 4k^3 - 6k^2 - 36k + 35}$.

Answer 58MYS.

To solve the given expression simplify both sides of the equality and then take like terms on one side and constant terms on the other,

Now the left hand side of the given expression can be simplified as shown

$$\begin{aligned} 6(x+2)+4 &= 6\cdot x+6\cdot 2+4 && \text{drop parenthesis} \\ &= 6x+12+4 && \text{simplify} \\ &= 6x+16 && \text{add like terms} \end{aligned}$$

Also the right hand side of the given expression can be simplified as

$$\begin{aligned} 5(3x-4) &= 5\cdot 3x-5\cdot 4 && \text{drop parenthesis} \\ &= 15x-20 && \text{simplify} \end{aligned}$$

Hence

$$6(x+2)+4=5(3x-4)$$
$$\Rightarrow \quad 6x+16=15x-20$$
$$6x+16+20=15x-20+20 \quad \text{add 20 both sides}$$
$$6x+36-6x=15x-6x \quad \text{subtract } 6x \text{ both sides}$$

Which on simplification gives

$$36=9x$$
$$x=\frac{36}{9} \quad \text{divide by 9}$$
$$x=4 \quad \text{simplify}$$

Therefore $\boxed{x=4}$ is the required solution.

Answer 59MYS.

To solve the given expression simplify both sides of the equality and then take like terms on one side and constant terms on the other,

Now the left hand side of the given expression can be simplified as shown

$$\begin{aligned}-3(3a-8)+2a &= -3\cdot 3a-3\cdot(-8)+2a && \text{drop parenthesis}\\ &= -9a+24+2a && \text{simplify}\\ &= -7a+24 && \text{subtract like terms}\end{aligned}$$

Also the right hand side of the given expression can be simplified as

$$\begin{aligned}4(2a+1) &= 4\cdot 2a+4\cdot 1 && \text{drop parenthesis}\\ &= 8a+4 && \text{simplify}\end{aligned}$$

Hence

$$-3(3a-8)+2a=4(2a+1)$$
$$\Rightarrow \quad -7a+24=8a+4$$
$$-7a+24-4=8a+4-4 \quad \text{subtact 4 both sides}$$
$$-7a+20+7a=8a+7a \quad \text{add } 7a \text{ both sides}$$

Which on simplification gives

$$20=15a$$
$$a=\frac{20}{15} \quad \text{divide by 15}$$
$$a=\frac{4}{3} \quad \text{simplify}$$

Therefore $\boxed{a=\frac{4}{3}}$ is the required solution.

Answer 60MYS.

To solve the given expression simplify both sides of the equality and then take like terms on one side and constant terms on the other,

Now the left hand side of the given expression can be simplified as shown

$$\begin{aligned} p(p+2)+3p &= p\cdot p+p\cdot 2+3p && \text{drop parenthesis} \\ &= p^2+2p+3p && \text{simplify} \\ &= p^2+5p && \text{add like terms} \end{aligned}$$

Also the right hand side of the given expression can be simplified as

$$\begin{aligned} p(p-3) &= p\cdot p-p\cdot 3 && \text{drop parenthesis} \\ &= p^2-3p && \text{simplify} \end{aligned}$$

Hence

$$p(p+2)+3p = p(p-3)$$

$$\Rightarrow \quad p^2+5p = p^2-3p$$

$$p^2+5p-p^2 = p^2-3p-p^2 \quad \text{subtact } p^2 \text{ both sides}$$

$$5p = -3p$$

Which is only possible when $p=0$

Therefore $\boxed{p=0}$ is the required solution.

Answer 61MYS.

To solve the given expression simplify both sides of the equality and then take like terms on one side and constant terms on the other,

Now the left hand side of the given expression can be simplified as shown

$$\begin{aligned} y(y-4)+2y &= y\cdot y - y\cdot 4 + 2y && \text{drop parenthesis} \\ &= y^2 - 4y + 2y && \text{simplify} \\ &= y^2 - 2y && \text{subtract like terms} \end{aligned}$$

Also the right hand side of the given expression can be simplified as

$$\begin{aligned} y(y+12)-7 &= y\cdot y + y\cdot 12 - 7 && \text{drop parenthesis} \\ &= y^2 + 12y - 7 && \text{simplify} \end{aligned}$$

Hence

$$y(y-4)+2y = y(y+12)-7$$

$$\Rightarrow \quad y^2 - 2y = y^2 + 12y - 7$$

$$y^2 - 2y - y^2 = y^2 + 12y - 7 - y^2 \quad \text{subtact } y^2 \text{ both sides}$$

$$-2y = 12y - 7$$

Now subtract 12y both sides gives

$$-2y - 12y = 12y - 7 - 12y$$

$$-14y = -7$$

$$y = \frac{-7}{-14} \qquad \text{divide both sides by } -14$$

$$y = \frac{1}{2} \qquad \text{simplify}$$

Therefore $\boxed{y = \frac{1}{2}}$ is the required solution.

Answer 62MYS.

To solve the given system of equations note that the coefficient of *x* in both the equations is same and the coefficient of *y* in first and second equation are same expect that the sign is different. So add the two equations which will eliminate the variable *y* as shown

$$\begin{array}{r} \frac{3}{4}x+\frac{1}{5}y=5 \\ +\frac{3}{4}x-\frac{1}{5}y=-5 \\ \hline \frac{3}{2}x+0y=0 \end{array}$$

Now

$$\frac{3}{2}x=0$$
$$\Rightarrow x=0$$

Now use $x=0$ in first equation gives

$$\frac{3}{4}(0)+\frac{1}{5}y=5$$
$$\Rightarrow \quad \frac{1}{5}y=5$$
$$y=25 \quad \text{multiply both sides by 5}$$

So the required solution for the given system of equations is $x=0,\ y=25$

Check: Replace *x* by 0 and *y* by 25 in the two equations reduces them to identity

Therefore $\boxed{x=0,\ y=25}$ is the required solution for the system of equation.

Answer 63MYS.

To solve the given system of equations note that the coefficient of x in first equation is 2 and the coefficient of x in second equation is 5 and the coefficient of y in first equation is –1 and the coefficient of y in second equation is 3, so multiply first equation by 3 both sides. Then equation first becomes $6x-3y=30$ now add second equation to this new equation will eliminate the variable y as shown

$$\begin{array}{r} 6x-3y=30 \\ +\underline{5x+3y=3} \\ 11x+0y=33 \end{array}$$

Now

$$\begin{aligned} 11x &= 33 \\ \Rightarrow x &= \frac{33}{11} \quad \text{divide both sides by } 11 \\ x &= 3 \end{aligned}$$

Now use $x=3$ in first equation gives

$$\begin{aligned} 2(3)-y &= 10 \\ \Rightarrow 6-y &= 10 \quad \text{simplify} \\ 6-y-6 &= 10-6 \quad \text{subtract 6 both sides} \\ y &= 4 \end{aligned}$$

So the required solution for the given system of equations is $x=3,\ y=4$

Check: Replace x by 3 and y by 4 in the two equations reduces them to identity

Therefore $\boxed{x=3,\ y=4}$ is the required solution for the system of equation.

Answer 64MYS.

Given system of equations can be written as

$$2x+3y=4$$
$$-x+3y=-11$$

Since the coefficient of *y* is same so subtract the two equations, by multiply second equation by –1 and then add the two equations, as shown

$$\begin{array}{rl} & 2x+3y=4 \\ + & \underline{x-3y=11} \\ & 3x+0y=15 \end{array}$$

Now

$$3x=15$$
$$\Rightarrow x=\frac{15}{3} \quad \text{divide both sides by 3}$$
$$x=5$$

Now use $x=5$ in second equation gives

$$2(5)=4-3y$$
$$\Rightarrow 10=4-3y \qquad \text{simplify}$$
$$10-4=4-3y-4 \qquad \text{subtract 4 both sides}$$
$$6=-3y$$

Now divide both sides by –3 gives $y=-2$.

So the required solution for the given system of equations is $x=5,\ y=-2$

Check: Replace *x* by 5 and *y* by –2 in the two equations reduces them to identity

Therefore $\boxed{x=5,\ y=-2}$ is the required solution for the system of equation.

Answer 65MYS.

First write the given equation in slope intercept form as

$$5x+5y=35$$
$$\frac{5x}{5}+\frac{5y}{5}=\frac{35}{5} \quad \text{divide each term by 5}$$
$$x+y=7$$
$$\Rightarrow \quad y=-x+7$$

So the slope intercept form for the given equation is $y=-x+7$. Which mean that its slope is –1.

Now if *m* is the slope of the line which is perpendicular to $y=-x+7$ and pass through the point $(-3,2)$. Then its equation is $y-2=m(x-(-3))$ ... (i).

Now since line (i) is perpendicular to $y=-x+7$ so the slope of (i) is the reciprocal of the slope of $y=-x+7$.

Thus $m=-\frac{1}{(-1)}$, as slope of $y=-x+7$ is –1, that is $m=1$

Use in (i) gives

$$y-2=1(x-(-3))$$
$$y-2=x+3 \quad \text{drop the parenthesis}$$
$$y-2+2=x+3+2 \quad \text{add 2 both sides}$$
$$y=x+5$$

Therefore the slope intercept form of the line is $\boxed{y=x+5}$.

Answer 66MYS.

First write the given equation in slope intercept form as

$$2x-5y=3$$
$$2x-5y-2x=3-2x \quad \text{subtract } 2x \text{ both sides}$$
$$-5y=-2x+3$$
$$\Rightarrow \quad y=\frac{-2x}{-5}+\frac{3}{-5}$$

So the slope intercept form for the given equation is $y=\frac{2x}{5}-\frac{3}{5}$. Which mean that its slope is $\frac{2}{5}$. Now if m is the slope of the line which is perpendicular to $y=\frac{2x}{5}-\frac{3}{5}$ and pass through the point $(-2,7)$. Then its equation is $y-7=m(x-(-2))$… (i).

Now since line (i) is perpendicular to $y=\frac{2x}{5}-\frac{3}{5}$ so the slope of (i) is the reciprocal of the slope of $y=\frac{2x}{5}-\frac{3}{5}$.

Thus $m=-\frac{1}{\left(\frac{2}{5}\right)}$, as slope of $y=\frac{2x}{5}-\frac{3}{5}$ is $\frac{2}{5}$, that is $m=-\frac{5}{2}$

Use in (i) gives

$$y-7=\frac{-5}{2}(x-(-2))$$
$$y-7=-\frac{5}{2}x-5 \quad \text{drop the parenthesis}$$
$$y-7+7=-\frac{5}{2}x-5+7 \quad \text{add 7 both sides}$$
$$y=-\frac{5}{2}x+2$$

Therefore the slope intercept form of the line is $\boxed{y=-\frac{5}{2}x+2}$.

Answer 67MYS.

First write the given equation in slope intercept form as

$$5x + y = 2$$
$$5x + y - 5x = 2 - 5x \quad \text{subtract } 5x \text{ both sides}$$
$$y = -5x + 2$$

So the slope intercept form for the given equation is $y = -5x + 2$. Which mean that its slope is –5. Now if *m* is the slope of the line which is perpendicular to $y = -5x + 2$ and pass through the point $(0, 6)$. Then its equation is $y - 6 = m(x - 0)$... (i).

Now since line (i) is perpendicular to $y = -5x + 2$ so the slope of (i) is the reciprocal of the slope of $y = -5x + 2$.

Thus $m = -\frac{1}{(-5)}$, as slope of $y = -5x + 2$ is –5, that is $m = \frac{1}{5}$

Use in (i) gives

$$y - 6 = \frac{1}{5}(x - 0)$$
$$y - 6 = \frac{1}{5}x \quad \text{drop the parenthesis}$$
$$y - 6 + 6 = \frac{1}{5}x + 6 \quad \text{add 6 both sides}$$
$$y = \frac{1}{5}x + 6$$

Therefore the slope intercept form of the line is $\boxed{y = \frac{1}{5}x + 6}$.

Answer 68MYS.

The *n*th term of a arithmetic series with first term *a*1 common difference *d*, is given by

$$a_n = a_1 + (n - 1)d$$

Here $a_1 = 3, d = 4, \text{ and } n = 18$

So

$$a_{18} = a_1 + (18 - 1)d$$
$$= 3 + 17 \cdot 4 \quad \text{substitute the given values}$$
$$= 3 + 68$$
$$= 71 \quad \text{simplify}$$

So the 18 th term is 71.

Answer 69MYS.

The *n*th term of a arithmetic series with first term *a*1 common difference *d*, is given by

$$a_n = a_1 + (n-1)d$$

Here $a_1 = -5$, to find *d*, find the difference between the second and first term , third and second term , fourth and third term and so on

Since $1-(-5)=6, 7-1=6, 13-7=6, \ldots$ So $d=6$, also $n=12$

Now

$$\begin{aligned} a_{12} &= a_1 + (12-1)d \\ &= -5 + 11 \cdot 6 && \text{substitute the above values} \\ &= -5 + 66 \\ &= 61 && \text{simplify} \end{aligned}$$

So the 12 th term is 61.

Answer 70MYS.

The graph which best represents Mitchell's heart rate as a function of time is *b* graph. As it can be when the time is zero there is some heart beat as he starts warm up the heart rates increases, as he starts running again the heart beat increases more and when he cools down the heart beat decreases, and comes back to normal.

Graph *a* can't represents the heart beat as a function of time because the heart beat can't be zero for a living person.

Graph *c* can't represents the heart beat as a function of time because the heart beat can't decreases as Mitchell starts running.

So graph *b* best represents Mitchell's heart beat as a function of time.