Chapter 8. Polynomials

Answer 1PT.

When two numbers in exponential form are multiplied with one another and their bases are same then the exponents are to be added

So

$$(4^2)(4^3) = 4^{2+3}$$
$$= 4^5$$

Also two numbers in exponential form are equal if their bases are same and the exponents are also same.

In 45 and 165 the powers are same but the bases are not same

So that is why $(4^2)(4^3) \neq 16^5$

Answer 1STP.

Since mean of the data changes the most by the extreme points, and 30 is very small as value as compared to the other points. So mean will be effected most than median.

Thus the correct option is A.

Option B, C and D are incorrect as only mean is effected by extreme values and 30 is a extreme value as compared to other values.

Answer 1VC.

In the given expression it is given that $4^{-3} = \frac{1}{4^3}$, since in negative exponent (p.419) the negative exponent has been changed by positive exponent in its reciprocal i.e for any nonzero number *a* and any integer *n*, $a^{-n} = \frac{1}{a^n}$

Therefore the best match is $\boxed{\text{Negative exponent (p.419)}}$

Answer 2PT.

Any number whose reciprocal is taken can be written as a number with negative exponent.

Now $\frac{1}{5} = 5^{-1}$

Thus in exponential form $\frac{1}{5}$ can be written as a number with negative exponent that is 5^{-1}

Answer 2STP.

If *x* denotes the number of metal bottle caps produced and *t* denotes the number of minutes the machine operates. Then by given condition $x \propto t$ which means that $x = kt$ … (i)

Where *k* is the proportionality constant. Since 2100 caps are produced in 60 minutes,

Use in (i) gives

$$(2100) = k(60)$$

$$\frac{2100}{60} = k \qquad \text{divide both sides by 60}$$

$$k = 35$$

So by (i) $x = 35t$. Now to find the time in which 5600 caps can be made put $x = 5600$ in the new equation

$$5600 = 35t$$

$$\frac{5600}{35} = t \qquad \text{divide both sides by 35}$$

$$t = 160$$

So in 160 minutes 5600 caps will be made.

Thus the correct option is D.

Answer 2VC.

In the given expression $(n^3)^5 = n^{15}$, since in power of a power (p.411) exponents are multiplied with each other in order to get the exponent of an exponent

Therefore the best match from the vocabulary list is $\boxed{\text{Power of a power (p.411)}}$

Answer 3PT.

A monomial is a polynomial with only one term.

For example $x, x^5, 4x^3y^6, \ldots$ are monomials as they have only one term.

Answer 3STP.

As the average rate of speed is obtained by dividing the distance travelled and the time taken to cover the distance. Juliana had travelled for 4 hours and the distance covered is the difference of 20750 and 20542.

Thus average rate of speed of Juliana is $r = \dfrac{20750 - 20542}{4}$

Thus the correct option is D.

Answer 3VC.

In the given expression it is shown $\frac{4x^2y}{8xy^3} = \frac{x}{2y^2}$, which is done in the Quotient of powers (p. 417)

Therefore the best match is $\boxed{\text{Quotient of powers (p.417)}}$

Answer 4PT.

Given expression can be simplified by using the fact that when two exponential numbers are multiplied with each other with same bases then the powers are to be added.

So

$$\begin{aligned}(a^2b^4)(a^3b^5) &= (a^2a^3)(b^4b^5) && \text{group like exponents}\\ &= (a^{2+3})(b^{4+5}) && \text{add exponents}\\ &= a^5b^9 && \text{simplify}\end{aligned}$$

Thus $\boxed{(a^2b^4)(a^3b^5) = a^5b^9}$

Answer 4STP.

The slope of the line is downwards so the coefficient of *x* in the slope intercept form of the line, must be negative. Also the line crosses the *y*–axis at $y = 1$, and crosses the *x*–axis at $x = 5$. From the given list of equation the equation $y = -\frac{1}{5}x + 1$, has all these properties.

<u>Thus the correct option is A.</u>

Option B is incorrect as the line crosses the *x*–axis at $x = 5$. Also option C is incorrect as slope is downwards.

Answer 4VC.

The given expression 4*x*2 is a monomial as it contains only one term 4*x*2, and in <u>monomials (p. 410)</u> and in <u>degree of monomials (p. 433)</u> monomials are read

Therefore from the vocabulary list the best match is

$\boxed{\text{Mononomial (p.410), degree of monomials (p. 433)}}$

Answer 5PT.

Given expression can be simplified by using the fact that when two exponential numbers are multiplied with each other with same bases then the powers are to be added.

So

$$\begin{aligned}(-12abc)(4a^2b^4) &= -12\cdot 4(aa^2)(bb^4)c && \text{group like exponents}\\ &= -48(a^{1+2})(b^{1+4})c && \text{add exponents}\\ &= -48a^3b^5c && \text{simplify}\end{aligned}$$

Thus $\boxed{(-12abc)(4a^2b^4) = -48a^3b^5c}$

Answer 5STP.

Each equation given in the four options are in the slope-intercept form. As the slope is –2 so the coefficient of *x* is –2. Also the line passes through the point $(-1,4)$, from the given equations only option B gives a line with slope and passes through $(-1,4)$.

Option A is incorrect as the line given by option A does not passes through $(-1,4)$.

Option C is incorrect as the line given by option C does not passes through $(-1,4)$. And

Option D is incorrect as the line given by option D does not passes through $(-1,4)$.

Thus the correct option is A.

Answer 5VC.

The given expression $x^2 - 3x + 1$ is a trinomial as it is a sum of three terms *x*2 ,-3*x* and 1

In trinomials (p. 432) trinomials are read.

Therefore from the vocabulary list the best match is $\boxed{\text{trinomial } (\text{p.}432)}$

Answer 6PT.

Given expression is $\left(\frac{2}{3}m\right)^2$, to simplify this use the fact that $(xy)^m = x^m y^m$

$$\begin{aligned}\left(\frac{2}{3}m\right)^2 &= \left(\frac{2}{3}\right)^2 m^2\\ &= \frac{4}{9}m^2 \qquad \text{as } \left(\frac{2}{3}\right)^2 = \frac{2^2}{3^2}\end{aligned}$$

Thus $\boxed{\left(\frac{2}{3}m\right)^2 = \frac{4}{9}m^2}$

Answer 6STP.

Total budget is \$7500, cost of each bookcase is \$125, and each set of table and chair costs \$550. Since Mr. Puram buys 4 sets of table and chairs and *b* number of bookcase. Then total cost of 4 sets of table and chairs is 4(550) and total cost of bookcase is *b*(125), since the total budget is 7500, thus *b* must satisfy $4(550)+b(125)\le 7500$,

Thus the correct option is A.

Answer 6VC.

The given expression is 20=1, since any nonzero number raised to the zero power is 1 that is 20=1, which is read in zero exponents (p. 419)

Therefore from the vocabulary list the best match is $\boxed{\text{Zero exponent (p.419)}}$

Answer 7PT.

Given expression is $(-3a)^4(a^5b)^2$, to simplify this use the fact that $(xy)^m = x^m y^m$

$$\begin{aligned}(-3a)^4(a^5b)^2 &= (-3)^4(a^4)(a^5)^2(b)^2 \\ &= 81(a^4a^{5\cdot 2})(b^2) && \text{as } (x^m)^n = x^{m\cdot n} \\ &= 81(a^4a^{10})(b^2) && \text{simplify exponent} \\ &= 81a^{14}b^2\end{aligned}$$

Thus $\boxed{(-3a)^4(a^5b)^2 = 81a^{14}b^2}$

Answer 7STP.

Let Allie spent \$*x* then Sophia spent $2x-25$, as the total amount spent is \$122, so

$$\begin{aligned}2x-25+x &= 122 \\ 3x-25+25 &= 122+25 \quad \text{added 25 both side} \\ 3x &= 147 \\ x &= 49\end{aligned}$$

Thus the correct option is B.

Answer 7VC.

The given expressionis $x^4-3x^3+2x^2-1$, which is a polynomial with degree 4 as the highest sum of the powers that appear on variables in terms of the polynomial is 4. This is read in Polynomials (p. 432) and in degree of polynomial (p. 433)

Thereforethe best match is

$\boxed{\text{Degree of a polynomial (p.433), degree of polynomial (p. 433)}}$

Answer 8PT.

Given expression is $\left(-5a^2\right)\left(-6b^3\right)^2$, to simplify this use the fact that $(xy)^m = x^m y^m$

$$\begin{aligned}\left(-5a^2\right)\left(-6b^3\right)^2 &= (-5)\left(a^2\right)(-6)^2\left(b^3\right)^2\\ &= (-5)(36)\left(a^2\right)\left(b^{3\cdot 2}\right) && \text{as } \left(x^m\right)^n = x^{m\cdot n}\\ &= -180\left(a^2\right)\left(b^6\right) && \text{simplify exponent}\\ &= -180a^2b^6\end{aligned}$$

Thus $\boxed{\left(-5a^2\right)\left(-6b^3\right)^2 = -180a^2b^6}$

Answer 8STP.

The product of 2x3 and 4x4 can be found by multiplying 2 and 4 and adding the exponents 3 and 4

$$\begin{aligned}\left(2x^3\right)\left(4x^4\right) &= (2)(4)\left(x^3x^4\right)\\ &= 8x^{3+4}\\ &= 8x^7\end{aligned}$$

Thus the correct option is D.

Answer 8VC.

In the given expression $(x+3)(x-4) = x^2 - 4x + 3x - 12$ FOIL method is used, which is read at page 453

Therefore from the vocabulary list the best match is $\boxed{\text{FOIL method (p.453)}}$

Answer 9PT.

Given expression is $\frac{mn^4}{m^3n^2}$, to simplify this use the fact that $\frac{x^m}{x^n} = x^{m-n}$

$$\begin{aligned}\frac{mn^4}{m^3n^2} &= m^{1-3}n^{4-2} && \text{use the fact that } \frac{x^m}{x^n} = x^{m-n}\\ &= m^{-2}n^2 && \text{simplify the exponents}\\ &= \frac{n^2}{m^2} && \text{as } x^{-n} = \frac{1}{x^n}\end{aligned}$$

Thus $\boxed{\frac{mn^4}{m^3n^2} = \frac{n^2}{m^2}}$

Answer 9STP.

There are three zeros on the right side of the decimal so $0.00037 = 0.37\times10^{-3}$, also $0.37 = 3.7\times10^{-1}$, thus $0.00037 = 3.7\times10^{-4}$, so the value of *n* is –4.

Thus the correct option is B.

Answer 9VC.

The given expression x^2+2 is a binomial as it is a sum of two terms x2 and 2

Which is read in binomials page 432.

Therefore from the vocabulary list the best match is $\boxed{\text{binomial (p.432)}}$

Answer 10PT.

Given expression is $\frac{9a^2bc^2}{63a^4bc}$, to simplify this use the fact that $\frac{x^m}{x^n} = x^{m-n}$

$$\begin{aligned}\frac{9a^2bc^2}{63a^4bc} &= \frac{1}{7}a^{2-4}b^{1-1}c^{2-1} && \text{use the fact that } \frac{x^m}{x^n} = x^{m-n}\text{, and cancel common factor}\\ &= \frac{1}{7}a^{-2}b^0c^1 && \text{simplify the exponents}\\ &= \frac{1}{7}\frac{c}{a^2} && \text{as } x^{-n} = \frac{1}{x^n}\text{, and } b^0 = 1\end{aligned}$$

Thus $\boxed{\frac{9a^2bc^2}{63a^4bc} = \frac{1}{7}\frac{c}{a^2}}$

Answer 10STP.

To subtract x^2-2x+1 from $3x^2-4x+5$. Change the sign of each term of x^2-2x+1 and then add or subtract the like terms

$$\begin{aligned}&\left(3x^2-4x+5\right)-\left(x^2-2x+1\right)\\ &= 3x^2-4x+5-x^2+2x-1\\ &= \left(3x^2-x^2\right)+\left(-4x+2x\right)+\left(5-1\right)\\ &= 2x^2-2x+4\end{aligned}$$

Thus the correct option is A.

Answer 10VC.

The given expression $\left(a^3b\right)\left(2ab^2\right)=2a^4b^3$ is a product of powers of a and b . which is read in product of powers page 411

Therefore from the vocabulary list the best match is $\boxed{\text{Product of powers } (\text{p.411})}$

Answer 11E.

To simplify the monomial $y^3 \cdot y^3 \cdot y$ use the fact that when bases are same the exponents are added.

$$\begin{aligned} y^3 \cdot y^3 \cdot y &= y^{3+3} \cdot y && \text{since bases are same so exponents are added} \\ &= y^6 \cdot y && \text{simplify exponent} \\ &= y^{6+1} && \text{since bases are same so exponents are added} \\ &= y^7 \end{aligned}$$

Therefore $\boxed{y^3 \cdot y^3 \cdot y = y^7}$

Answer 12E.

To simplify the given expression $(3ab)\left(-4a^2b^3\right)$ use commutative property which states that if a and b are two numbers then $a \cdot b = b \cdot a$ andthe fact that when bases are same the exponents are added.

$$\begin{aligned} (3ab)\left(-4a^2b^3\right) &= (3\cdot -4)\left(a\cdot a^2\right)\left(b\cdot b^3\right) && \text{Commutative property} \\ &= -12\times a^{1+2}\times b^{1+3} && \text{Bases are same exponents are added} \\ &= -12a^3b^4 && \text{Simplify} \end{aligned}$$

Therefore $\boxed{(3ab)\left(-4a^2b^3\right)=-12a^3b^4}$

Answer 12PT.

A number is said to be in scientific notification if it is multiplied by power of 10 and one non zero digit is placed in front of the decimal and all other digits are written on the right hand side of the decimal.

In the given number there are two zeros so

$$46300 = 463 \times 100$$
$$= 463 \times 10^2 \quad \text{as } 10^2 = 100$$

Also

$$463 = 4.63 \times 100 \quad \text{as } 4.63 = \frac{463}{100}$$
$$= 4.63 \times 10^2$$

So in scientific notation

$$46300 = 4.63 \times 10^2 \times 10^2 \quad \text{use above values}$$
$$= 4.63 \times 10^{2+2} \quad \text{bases same so add exponents}$$
$$= 4.63 \times 10^4 \quad \text{simplify}$$

Therefore in scientific notation 463,00 is written as $\boxed{4.63 \times 10^4}$

Answer 13E.

To simplify the given expression $(-4a^2x)(-5a^3x^4)$ use commutative property which states that if a and b are two numbers then $a \cdot b = b \cdot a$ andthe fact that when bases are same the exponents are added.

$$(-4a^2x)(-5a^3x^4) = (-4 \cdot -5)(a^2 \cdot a^3)(x \cdot x^4) \quad \text{Commutative property}$$
$$= 20 \cdot a^{2+3} \cdot x^{1+4} \quad \text{Bases are same exponents are added}$$
$$= 20a^5x^5 \quad \text{Simplify}$$

Therefore $\boxed{(-4a^2x)(-5a^3x^4) = 20a^5x^5}$

Answer 13PT.

A number is said to be in scientific notification if it is multiplied by power of 10 and one non zero digit is placed in front of the decimal and all other digits are written on the right hand side of the decimal.

In the given number there are two zeros after the decimal so

$$0.003892 = \frac{0.3892}{100}$$
$$= 0.3892 \times 10^{-2} \qquad \text{as } 10^{-2} = \frac{1}{100}$$

Also

$$0.3892 = \frac{3.892}{10} \qquad \text{as } 3.892 = 0.3892 \times 10$$
$$= 3.892 \times 10^{-1} \quad \text{as } 10^{-1} = \frac{1}{10}$$

Therefore

$$\begin{aligned} 0.003892 &= 3.892 \times 10^{-1} \times 10^{-2} && \text{use above values} \\ &= 3.892 \times 10^{-1+(-2)} && \text{bases same so add exponents} \\ &= 3.892 \times 10^{-3} && \text{simplify} \end{aligned}$$

Therefore in scientific notation 0.003892 is written as $\boxed{3.892 \times 10^{-3}}$

Answer 14E.

To simplify the given expression $(4a^2b)^3$ use the property power of a power which means to multiply exponents and the property power of a product is a product of the powers.

$$\begin{aligned} (4a^2b)^3 &= (4)^3(a^2)^3(b)^3 && \text{Power of a product} \\ &= (4 \cdot 4 \cdot 4)a^6b^3 && \text{Power of a power} \\ &= 64a^6b^3 && \text{Simplify} \end{aligned}$$

Therefore $\boxed{(4a^2b)^3 = 64a^6b^3}$

Answer 14PT.

A number is said to be in scientific notification if it is multiplied by power of 10 and one non zero digit is placed in front of the decimal and all other digits are written on the right hand side of the decimal.

In the given number 284 can be written as

$$\begin{aligned} 284 &= 2.84 \times 100 \qquad \text{as } 2.84 = \frac{284}{100} \\ &= 2.84 \times 10^2 \qquad \text{as } 100 = 10^2 \end{aligned}$$

Therefore

$$\begin{aligned} 284 \times 10^3 &= 2.84 \times 10^2 \times 10^3 \qquad \text{use above values} \\ &= 2.84 \times 10^{2+3} \qquad \text{bases same so add exponents} \\ &= 2.84 \times 10^5 \qquad \text{simplify} \end{aligned}$$

Therefore in scientific notation 284×10^3 is written as $\boxed{2.84 \times 10^5}$

Answer 15E.

To simplify the given expression $(-3xy)^2(4x)^3$ use the property power of a product is a product of the powers and the property when bases are same exponents are added.

$$\begin{aligned} (-3xy)^2(4x)^3 &= (-3)^2(x)^2(y)^2(4)^3(x)^3 \qquad \text{Power of a product} \\ &= 9 \cdot 64 \cdot x^{2+3}y^2 \qquad \text{Bases are same exponents are added and simplify} \\ &= 576x^5y^2 \qquad \text{Simplify} \end{aligned}$$

Therefore $\boxed{(-3xy)^2(4x)^3 = 576x^5y^2}$

Answer 15PT.

A number is said to be in scientific notification if it is multiplied by power of 10 and one non zero digit is placed in front of the decimal and all other digits are written on the right hand side of the decimal.

In the given number 52.8 can be written as

$$52.8 = 5.28 \times 10 \qquad \text{as } 5.28 = \frac{52.8}{10}$$

Therefore

$$\begin{aligned} 52.8 \times 10^{-9} &= 5.28 \times 10 \times 10^{-9} \qquad \text{use above values} \\ &= 5.28 \times 10^{1+(-9)} \qquad \text{bases same so add exponents} \\ &= 5.28 \times 10^{-8} \qquad \text{simplify} \end{aligned}$$

Therefore in scientific notation 52.8×10^{-9} is written as $\boxed{5.28 \times 10^{-8}}$

Answer 16E.

To simplify the given expression $\left(-2c^2d\right)^4\left(-3c^2\right)^3$ use the properties, power of a power which means to multiply exponents, the property power of a product is a product of the powers and the property when bases are same exponents are added.

$$\begin{aligned}\left(-2c^2d\right)^4\left(-3c^2\right)^3 &= (-2)^4\left(c^2\right)^4(d)^4(-3)^3\left(c^2\right)^3 && \text{Power of a product}\\ &= (-2\cdot-2\cdot-2\cdot-2)(c)^8(d)^4(-3\cdot-3\cdot-3)(c)^6 && \text{Power of a power}\\ &= (16\cdot-27)(c)^{8+6}(d)^4 && \text{Bases are same exponents are added}\\ &= -432c^{14}d^4 && \text{Simplify and drop the parenthesis}\end{aligned}$$

Therefore $\boxed{\left(-2c^2d\right)^4\left(-3c^2\right)^3 = -432c^{14}d^4}$

Answer 16PT.

A number is said to be in scientific notification if it is multiplied by power of 10 and one non zero digit is placed in front of the decimal and all other digits are written on the right hand side of the decimal.

Now to evaluate $\left(3\times10^3\right)\left(2\times10^4\right)$ group the numbers with same base and exponent as shown

$$\begin{aligned}\left(3\times10^3\right)\left(2\times10^4\right) &= (3\times2)\left(10^3\times10^4\right)\\ &= (6)\left(10^{3+4}\right) && \text{base is same so add exponents}\\ &= 6\times10^7\end{aligned}$$

Therefore in scientific notation $\boxed{\left(3\times10^3\right)\left(2\times10^4\right) = 6\times10^7}$.

Now since 107 has seven zeros, so in standard notation $\boxed{\left(3\times10^3\right)\left(2\times10^4\right) = 60000000}$

Answer 17E.

To simplify the given expression $-\frac{1}{2}\left(m^2n^4\right)^2$ use the properties, power of a power which means to multiply exponents and the property power of a product is a product of the power.

$$\begin{aligned}-\frac{1}{2}\left(m^2n^4\right)^2 &= -\frac{1}{2}\cdot\left(m^2\right)^2\left(n^4\right)^2 && \text{Power of a product}\\ &= -\frac{1}{2}\cdot(m)^4(n)^8 && \text{Power of a power}\\ &= -\frac{1}{2}m^4n^8 && \text{Drop the parenthesis}\end{aligned}$$

Therefore $\boxed{-\frac{1}{2}\left(m^2n^4\right)^2 = -\frac{1}{2}m^4n^8}$

Answer 17PT.

A number is said to be in scientific notification if it is multiplied by power of 10 and one non zero digit is placed in front of the decimal and all other digits are written on the right hand side of the decimal.

Now to evaluate $\frac{14.72\times10^{-4}}{3.2\times10^{-3}}$, use the fact that $14.72=1472\times10^{-2}$ and $3.2=32\times10^{-1}$

$$\begin{aligned}\frac{14.72\times10^{-4}}{3.2\times10^{-3}}&=\frac{1472\times10^{-2}\times10^{-4}}{32\times10^{-1}\times10^{-3}}\\&=\frac{1472\times10^{-2+(-4)}}{32\times10^{-1+(-3)}}&&\text{base is same so add exponents}\\&=\frac{46\times10^{-6}}{10^{-4}}&&\text{divide 1472 by 32}\\&=46\times10^{-6-(-4)}&&\text{as }\frac{x^n}{x^m}=x^{n-m}\end{aligned}$$

Simplify the exponent gives

$$\begin{aligned}\frac{14.72\times10^{-4}}{3.2\times10^{-3}}&=46\times10^{-2}\\&=4.6\times10\times10^{-2}&&\text{as }4.6\times10=46\\&=4.6\times10^{1+(-2)}&&\text{add the exponents}\\&=4.6\times10^{-1}\end{aligned}$$

Therefore in scientific notation $\boxed{\frac{14.72\times10^{-4}}{3.2\times10^{-3}}=4.6\times10^{-1}}$.

Now to find the standard notation divide 4.6 by 10 as the power of 10 is –1.

So $4.6\times10^{-1}=0.46$

Thus in standard notation $\boxed{\frac{14.72\times10^{-4}}{3.2\times10^{-3}}=0.46}$.

Answer 18E.

To simplify the given expression $(5a^2)^3+(7a^6)$ use the properties, power of a power which means to multiply exponents and the property power of a product is a product of the power.

$$\begin{aligned}(5a^2)^3+(7a^6)&=(5)^3(a^2)^3+(7a^6)&&\text{Power of a product}\\&=(5\cdot5\cdot5)(a)^6+(7a^6)&&\text{Power of a power}\\&=125a^6+7a^6&&\text{Simplify}\\&=(125+7)a^6&&\text{Take }a^6\text{common}\\&=(132)a^6&&\text{Drop the parenthesis}\end{aligned}$$

Therefore $\boxed{(5a^2)^3+(7a^6)=132a^6}$

Answer 18PT.

A number is said to be in scientific notification if it is multiplied by power of 10 and one non zero digit is placed in front of the decimal and all other digits are written on the right hand side of the decimal.

Now to evaluate $\left(15\times10^{-7}\right)\left(3.1\times10^{4}\right)$, use the fact that $3.1=31\times10^{-1}$

So

$$\begin{aligned}\left(15\times10^{-7}\right)\left(3.1\times10^{4}\right)&=\left(15\times10^{-7}\right)\left(31\times10^{-1}\times10^{4}\right)\\&=\left(15\times10^{-7}\right)\left(31\times10^{-1+4}\right) &&\text{base is same so add exponents}\\&=\left(15\times31\right)\left(10^{-7}\times10^{3}\right) &&\text{group the numbers}\\&=465\times10^{-4} &&\text{subtract the exponents}\end{aligned}$$

Since

$$\begin{aligned}465&=4.65\times100 \quad \text{as } 4.65\times100=465\\&=4.65\times10^{2}\end{aligned}$$

Thus

$$\begin{aligned}\left(15\times10^{-7}\right)\left(3.1\times10^{4}\right)&=4.65\times10^{2}\times10^{-4}\\&=4.65\times10^{2+(-4)} \quad \text{add exponents}\\&=4.65\times10^{-2}\end{aligned}$$

Therefore in scientific notation $\boxed{\left(15\times10^{-7}\right)\left(3.1\times10^{4}\right)=4.65\times10^{-2}}$.

Now to find the standard notation divide 4.65 by 100 as the power of 10 is –2.

So $4.65\times10^{-2}=0.0465$

Thus in standard notation $\boxed{\left(15\times10^{-7}\right)\left(3.1\times10^{4}\right)=0.0465}$.

Answer 13E.

To simplify the given expression $\left[\left(3^{2}\right)^{2}\right]^{3}$ use the property power of a power which means to multiply exponents.

$$\begin{aligned}\left[\left(3^{2}\right)^{2}\right]^{3}&=\left[(3)^{4}\right]^{3} &&\text{Power of a power}\\&=(3)^{12} &&\text{Power of a power}\\&=531441 &&\text{Multiply 3 twelve times}\end{aligned}$$

Therefore $\boxed{\left[\left(3^{2}\right)^{2}\right]^{3}=531441}$

Answer 19PT.

Speed of radio signals send by the space probe is given to be 1.86×10^5 miles per second. And the distance between the space probe and NASA is given to be 2.85×10^9 miles.

Now to find the time taken by the signal send by the space probe to reach NASA is given by $\text{time}=\dfrac{\text{distance}}{\text{speed}}$.

Substitute the values gives, $\text{time}=\dfrac{2.85\times10^9}{1.86\times10^5}$.

Now since $2.85=285\times10^{-2}$ and $1.86=186\times10^{-2}$, so

$$\begin{aligned}\frac{2.85\times10^9}{1.86\times10^5}&=\frac{285\times10^{-2}\times10^9}{186\times10^{-2}\times10^5}\\&=\frac{285\times10^{-2+9}}{186\times10^{-2+5}} && \text{base is same so add exponents}\\&=\frac{95\times10^7}{62\times10^3} && \text{cancel the common factor 3}\\&=\frac{95}{62}\times10^{7-3} && \text{as } \frac{x^n}{x^m}=x^{n-m}\end{aligned}$$

Simplify the exponent gives

$$\begin{aligned}\frac{2.85\times10^9}{1.86\times10^5}&=\frac{95}{62}\times10^4\\&=\frac{950}{62}\times10^3 && \text{as } 950\times10^3=95\times10^4\\&=\frac{475}{31}\times10^3 && \text{cancel the common factor 2}\\&\approx15.32\times10^3 && \text{divide 475 by 31}\end{aligned}$$

Now $15.32=1.532\times10$, so $\dfrac{2.85\times10^9}{1.86\times10^5}=1.532\times10^4$

Therefore $\boxed{\text{the time taken by the signal to reach NASA is } 1.532\times10^4 \text{ seconds}}$.

Answer 20E.

To simplify the given expression $\dfrac{(3y)^0}{6a}$ use the property that any nonzero number raised to the zero power is 1.

$$\begin{aligned}\frac{(3y)^0}{6a}&=\frac{1}{6a} && \text{Nonzero number raised to the zero power is 1.}\\&=\frac{1}{6a}\end{aligned}$$

Therefore $\boxed{\dfrac{(3y)^0}{6a}=\dfrac{1}{6a}}$

Answer 20PT.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there is only one variable *y* and its highest power is 4.

So the degree of the polynomial is 4.

Now write the term with highest power that is 4, first which is 8*y*4 then the term with power 2 which is 2*y*2 as the term with power 3 is not present and then the term with power 1 which is 9*y*.

So in descending powers of *y*, given polynomial can be written as $8y^4 + 2y^2 + 9y$

Therefore in descending powers of *y* the polynomial is $\boxed{8y^4 + 2y^2 + 9y}$.

Answer 21E.

To simplify the given expression $\left(\frac{3bc^2}{4d}\right)^3$ find the power of a numerator and the power of a denominator in order to find the power of the quotient.

$$\left(\frac{3bc^2}{4d}\right)^3 = \left(\frac{3^3}{4^3}\right)\left(\frac{b^3\left(c^2\right)^3}{d^3}\right) \quad \text{Power of a product}$$

$$= \left(\frac{3\cdot3\cdot3}{4\cdot4\cdot4}\right)\left(\frac{b^3\left(c\right)^6}{d^3}\right) \quad \text{Power of a power}$$

$$= \left(\frac{27}{64}\right)\left(\frac{b^3c^6}{d^3}\right) \quad \text{Simplify}$$

$$= \frac{27b^3c^6}{64d^3} \quad \text{Drop the parenthesis}$$

Therefore $\boxed{\left(\frac{3bc^2}{4d}\right)^3 = \frac{27b^3c^6}{64d^3}}$

Answer 21PT.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are two variables *x* and *y* and the sum of powers of *x* and *y* in different terms is 2,0,4 and 5. As the highest sum is 5 for the term *x*2*y*3 .

So the degree of the polynomial is 5.

Now write the term with highest power of *y* that is 4, first which is 2*y*4 then the term with power 3 of *y* which is *x*2*y*3 , as the term with power 2 of *y* is not present, write the term with power 1 of *y* which is 5*xy*.

So in descending powers of *y*, given polynomial can be written as $2y^4 - x^2y^3 + 5xy - 7$

Therefore in descending powers of *y* the polynomial can be written as $\boxed{2y^4 - x^2y^3 + 5xy - 7}$

Answer 22E.

To simplify the given expression $x^{-2}y^0z^3$ use the property that any nonzero number raised to the zero power is 1 and also use the property that for any nonzero number a and any integer $n, a^{-n} = \frac{1}{a^n}$,

$$x^{-2}y^0z^3 = \frac{1}{x^2}y^0z^3 \quad \text{Since } a^{-n} = \frac{1}{a^n},$$

$$= \frac{1}{x^2}\cdot 1\cdot z^3 \quad \text{Any nonzero number raised to the zero power is 1}$$ Therefore

$$= \frac{z^3}{x^2} \quad \text{Simplify}$$

$$\boxed{x^{-2}y^0z^3 = \frac{z^3}{x^2}}$$

Answer 22PT.

Given polynomials are $5a+3a^2-7a^3$ and $2a-8a^2+4$, to add the polynomials note that like terms are added or subtracted depending on their sign. Group the like terms in the following way

$$\left(5a+3a^2-7a^3\right)+\left(2a-8a^2+4\right)$$

$$= -7a^3+\left(3a^2-8a^2\right)+\left(5a+2a\right)+4 \quad \text{write in descending powers of } a$$

$$= -7a^3-5a^2+7a+4 \quad \text{as } 3a^2-8a^2=-5a^2 \text{ and } 5a+2a=7a$$

Hence $\boxed{\left(5a+3a^2-7a^3\right)+\left(2a-8a^2+4\right) = -7a^3-5a^2+7a+4}$

Answer 23E.

To simplify the given expression $\frac{27b^{-2}}{14b^{-3}}$ use the property that for any nonzero number a and any integer $n, \frac{1}{a^{-n}} = a^n$,

$$\frac{27b^{-2}}{14b^{-3}} = \left(\frac{27}{14}\right)b^{-2}b^3 \quad \text{Since } \frac{1}{a^{-n}} = a^n$$

$$= \frac{27}{14}b^{-2+3} \quad \text{Bases are same exponents are added}$$

$$= \frac{27}{14}b \quad \text{Simplify}$$

Therefore $\boxed{\frac{27b^{-2}}{14b^{-3}} = \frac{27}{14}b}$

Answer 23PT.

Given polynomials are $x^3 - 3x^2y + 4xy^2 + y^3$ and $7x^3 + x^2y - 9xy^2 + y^3$, to subtract the polynomials note that like terms are subtracted or add depending on their sign. Group the like terms in the following way

$$\begin{aligned}
&\left(x^3 - 3x^2y + 4xy^2 + y^3\right) - \left(7x^3 + x^2y - 9xy^2 + y^3\right) && \text{change sign of each-}\\
&= x^3 - 3x^2y + 4xy^2 + y^3 - 7x^3 - x^2y + 9xy^2 - y^3 && \text{term in second polynomial}\\
&= \left(x^3 - 7x^3\right) + \left(-3x^2y - x^2y\right) + \left(4xy^2 + 9xy^2\right) + \left(y^3 - y^3\right) && \text{group like terms}\\
&= -6x^3 - 4x^2y + 13xy^2 && \text{simplify each term inparenthesis}
\end{aligned}$$

Hence $\boxed{\left(x^3 - 3x^2y + 4xy^2 + y^3\right) - \left(7x^3 + x^2y - 9xy^2 + y^3\right) = -6x^3 - 4x^2y + 13xy^2}$

Answer 24E.

To simplify the given expression $\frac{\left(3a^3bc^2\right)^2}{18a^2b^3c^4}$ use the property that for any nonzero number a and any integer n, $\frac{1}{a^{-n}} = a^n$ and $a^{-n} = \frac{1}{a^n}$.

$$\begin{aligned}
\frac{\left(3a^3bc^2\right)^2}{18a^2b^3c^4} &= \frac{3^2\left(a^3\right)^2(b)^2\left(c^2\right)^2}{18a^2b^3c^4} && \text{Power of a product}\\
&= \left(\frac{9}{18}\right)\frac{a^6b^2c^4}{a^2b^3c^4} && \text{Power of a power}\\
&= \frac{1}{2}\left(\frac{a^6}{a^2}\right)\left(\frac{b^2}{b^3}\right)\left(\frac{c^4}{c^4}\right) && \text{Group the powers with the same base}\\
&= \frac{1}{2}\left(a^{6-2}\right)\left(b^{2-3}\right)\left(c^{4-4}\right) && \text{Since } \frac{1}{a^n} = a^{-n}\\
&= \frac{1}{2}\left(a^4\right)\left(b^{-1}\right)\left(c^0\right) && \text{Any nonzero number raised zero to the power is 1}\\
&= \frac{a^4}{2b} && \text{Simplify}
\end{aligned}$$

Therefore $\boxed{\frac{\left(3a^3bc^2\right)^2}{18a^2b^3c^4} = \frac{a^4}{2b}}$

Answer 24PT.

As the perimeter of a triangle is the sum of three sides, if l is the length of the third side then by the definition of perimeter

$$l+(x^2+7x+9)+(5x^2-13x+24)=11x^2-29x+10 \quad \ldots \text{(i)}$$

Now

$$(x^2+7x+9)+(5x^2-13x+24)$$
$$=(x^2+5x^2)+(7x-13x)+(9+24) \quad \text{group the like terms}$$
$$=6x^2-6x+33 \quad \text{simplify each parenthesis}$$

Thus by (i)

$$l+(6x^2-6x+33)=11x^2-29x+10$$
$$\Rightarrow \quad l=11x^2-29x+10-(6x^2-6x+33)$$

Now the difference of the two polynomials is done in the following way

$$11x^2-29x+10-(6x^2-6x+33) \quad \text{change sign of each-}$$
$$=11x^2-29x+10-6x^2+6x-33 \quad \text{term of second polynomial}$$
$$=(11x^2-6x^2)+(-29x+6x)+(10-33) \quad \text{group like terms}$$
$$=5x^2-23x-23 \quad \text{simplify the parenthesis}$$

Hence the length of the third side is $\boxed{5x^2-23x-23}$

Answer 25E.

To simplify the given expression $\dfrac{-16a^3b^2x^4y}{-48a^4bxy^3}$ use the property that for any nonzero number a and any integer n, $\dfrac{1}{a^{-n}}=a^n$ and $a^{-n}=\dfrac{1}{a^n}$,

$$\frac{-16a^3b^2x^4y}{-48a^4bxy^3}=\left(\frac{-16}{-48}\right)\left(\frac{a^3}{a^4}\right)\left(\frac{b^2}{b}\right)\left(\frac{x^4}{x}\right)\left(\frac{y}{y^3}\right) \quad \text{Group the powers with the same base}$$
$$=\left(\frac{1}{3}\right)(a^{3-4})(b^{2-1})(x^{4-1})(y^{1-3}) \quad \text{Quotient of powers}$$
$$=\frac{1}{3}(a^{-1})(b^1)(x^3)(y^{-2}) \quad \text{Simplify}$$
$$=\frac{bx^3}{3ay^2} \quad \text{Since } a^{-n}=\frac{1}{a^n}$$

Therefore $\boxed{\dfrac{-16a^3b^2x^4y}{-48a^4bxy^3}=\dfrac{bx^3}{3ay^2}}$

Answer 25PT.

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 $p = h$, and $q = 5$ gives

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

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

Answer 26E.

To simplify the given expression $\frac{(-a)^5 b^8}{a^5 b^2}$ use the property that for any nonzero number a and any integer n, $a^{-n} = \frac{1}{a^n}$, and any nonzero number raised zero to the power is 1

$$\begin{aligned}\frac{(-a)^5 b^8}{a^5 b^2} &= \left(\frac{-a^5}{a^5}\right)\left(\frac{b^8}{b^2}\right) && \text{Group the powers with the same base} \\ &= \left(-a^{5-5}\right)\left(b^{8-2}\right) && \text{Quotient of powers} \\ &= \left(-a^0\right)\left(b^6\right) && \text{Simplify} \\ &= -1\cdot b^6 && \text{Any nonzero number raised zero to the power is 1} \\ &= -b^6 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{\frac{(-a)^5 b^8}{a^5 b^2} = -b^6}$

Answer 26PT.

To find the given product note that the first binomial is the difference of 4*x* 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

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

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

Answer 27E.

To simplify the given expression $\frac{(4a^{-1})^{-2}}{(2a^4)^2}$ use the property that for any nonzero number a and any integer n, $a^{-n} = \frac{1}{a^n}$, and $\frac{1}{a^n} = a^{-n}$

$$\frac{(4a^{-1})^{-2}}{(2a^4)^2} = \frac{(4)^{-2}(a^{-1})^{-2}}{(2)^2(a^4)^2} \quad \text{Power of a product}$$

$$= \frac{(4)^{-2}(a)^2}{(2)^2(a)^8} \quad \text{Power of a power}$$

$$= \left(\frac{1}{(4)^2 \cdot (2)^2}\right)(a^{2-8}) \quad \text{Since } \frac{1}{a^n} = a^{-n}$$

$$= \left(\frac{1}{64}\right)a^{-6} \quad \text{Simplify}$$

$$= \frac{1}{64a^6} \quad \text{Since } a^{-n} = \frac{1}{a^n}$$

Therefore $\boxed{\frac{(4a^{-1})^{-2}}{(2a^4)^2} = \frac{1}{64a^6}}$

Answer 27PT.

To find the given product multiply each term of the binomial by the monomial $3x^2y^3$ and use the property that $p^m \cdot p^n = p^{m+n}$ gives

$$3x^2y^3(2x - xy^2) = 3x^2y^3(2x) - 3x^2y^3(xy^2)$$

$$= 6x^{2+1}y^3 - 3x^{2+1}y^{3+2}$$

$$= 6x^3y^3 - 3x^3y^5 \quad \text{simplify}$$

Thus $\boxed{3x^2y^3(2x - xy^2) = 6x^3y^3 - 3x^3y^5}$

Answer 28E.

To simplify the given expression $\left(\frac{5xy^{-2}}{35x^{-2}y^{-6}}\right)^0$ use the property that for any nonzero number raised to the zero power is 1

$$\left(\frac{5xy^{-2}}{35x^{-2}y^{-6}}\right)^0 = 1 \qquad \text{Any nonzero number raised to the zero power is 1}$$

Therefore $\boxed{\left(\frac{5xy^{-2}}{35x^{-2}y^{-6}}\right)^0 = 1}$

Answer 28PT.

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 $p = 2a^2b, \text{ and } q = b^2$ gives

$$\begin{aligned}(2a^2b+b^2)^2 &= (2a^2b)^2 + (b^2)^2 + 2(2a^2b)\cdot(b^2) \\ &= 2^2(a^2)^2 b^2 + (b^2)^2 + 4a^2b^{1+2} && \text{use the property } (xy)^m = x^m y^m \\ &= 4a^4b^2 + b^4 + 4a^2b^3 && \text{use the property } (x^n)^m = x^{nm}\end{aligned}$$

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

Answer 29E.

To express the given expression 2.4×10^5 in the standard notation as $n=5$, move decimal point 5 places to the right.

$$2.4\times10^5 = 240000 \qquad \text{Here n=5; move decimal point 5 places to the right}$$

Therefore $\boxed{2.4\times10^5 = 240000}$

Answer 29PT.

To find the given product note that the first binomial is the sum of 4*m* and 3*n* 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

$$(4m-3n)(4m+3n)=(4m)^2-(3n)^2$$
$$=4^2m^2-3^2n^2 \quad \text{since } (xy)^m=x^my^m$$
$$=16n^2-9n^2 \quad \text{simplify}$$

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

Answer 30E.

To express the given expression 3.14×10^{-4} in the standard notation as $n=-4$, since n is negative therefore move decimal point 4 places to the left.

$$3.14\times10^{-4}=0.000314 \quad \text{Here n=-4; move decimal point 4 places to the left}$$

Therefore $\boxed{3.14\times10^{-4}=0.000314}$

Answer 30PT.

The given product is the product of a binomial and a trinomial, to find the product multiply each term of the trinomial by each term of the binomial and use the property that $p^m\cdot p^n=p^{m+n}$ gives

$$(2c+5)(3c^2-4c+2)$$
$$=2c(3c^2)-2c(4c)+2c(2)+5(3c^2)-5(4c)+5(2)$$
$$=6c^{1+2}-8c^{1+1}+4c+15c^2-20c+10 \quad \text{simplify the terms}$$
$$=6c^3-8c^2+4c+15c^2-20c+10$$

Now group the like terms as shown

$$(2c+5)(3c^2-4c+2)$$
$$=6c^3+(-8c^2+15c^2)+(4c-20c)+10$$
$$=6c^3+7c^2-16c+10 \quad \text{simplify the terms in parenthesis}$$

Thus $\boxed{(2c+5)(3c^2-4c+2)=6c^3+7c^2-16c+10}$

Answer 31E.

To express the given expression 4.88×10^9 in the standard notation as $n=9$, move decimal point 9 places to the right.

$$4.88\times10^9 = 4880000000 \qquad \text{Here n=9; move decimal point 9 places to the right}$$

Therefore $\boxed{4.88\times10^9 = 4880000000}$

Answer 31PT.

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

$$\begin{aligned} 2x(x-3) &= 2x\cdot x - 2x\cdot 3 \quad \text{drop parenthesis} \\ &= 2x^2 - 6x \qquad \text{simplify} \end{aligned}$$

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

$$\begin{aligned} 2(x^2-7)+2 &= 2\cdot x^2 - 2\cdot 7 + 2 \quad \text{drop parenthesis} \\ &= 2x^2 - 14 + 2 \qquad \text{simplify} \\ &= 2x^2 - 12 \end{aligned}$$

Hence

$$2x(x-3) = 2(x^2-7)+2$$

$$\Rightarrow \quad 2x^2 - 6x = 2x^2 - 12$$

$$2x^2 - 6x - 2x^2 = 2x^2 - 12 - 2x^2 \quad \text{subtact } 2x^2 \text{ both sides}$$

$$-6x = -12$$

Now divide both sides by –6 gives

$$\frac{-6x}{-6} = \frac{-12}{-6}$$

$$x = 2 \qquad \text{simplify}$$

Therefore $\boxed{x=2}$ is the required solution.

Answer 32E.

To express 0.00000187 in the scientific notation, use the propertythat a number is expressed in scientific notation when it is written as a product of a factor and a power of 10. The factor must be greater than or equal to 1 and less than 10, that is

$$a \times 10^n, \quad \text{where } 1 \le a < 10 \text{ and } n \text{ is an integer}$$

$$0.00000187 = 1.87 \times 10^{-6} \qquad \text{Here a=1.87, n=-6 move decimal point 6 places to the right}$$

Therefore $\boxed{0.00000187 = 1.87 \times 10^{-6}}$

Answer 32PT.

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

$$3a(a^2+5)-11 = 3a \cdot a^2 + 3a \cdot 5 - 11 \qquad \text{drop parenthesis}$$

$$= 3a^3 + 15a - 11 \qquad \text{simplify}$$

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

$$a(3a^2+4) = a \cdot 3a^2 + a \cdot 4 \qquad \text{drop parenthesis}$$

$$= 3a^3 + 4a \qquad \text{simplify}$$

Hence

$$3a(a^2+5)-11 = a(3a^2+4)$$

$$\Rightarrow \quad 3a^3 + 15a - 11 = 3a^3 + 4a$$

$$3a^3 + 15a - 11 - 3a^3 = 3a^3 + 4a - 3a^3 \qquad \text{subtact } 3a^3 \text{ both sides}$$

$$15a - 11 = 4a$$

Now subtract $15a$ both sides gives

$$15a - 11 - 15a = 4a - 15a$$

$$-11 = -11a$$

$$a = 1 \qquad \text{simplify}$$

Therefore $\boxed{a=1}$ is the required solution.

Answer 33E.

To express 796×10^3 in the scientific notation, use the propertythat a number is expressed in scientific notation when it is written as a product of a factor and a power of 10. The factor must be greater than or equal to 1 and less than 10, that is

$a\times10^n$, where $1\le a<10$ and n is an integer

$$\begin{aligned}796\times10^3 &= \left(7.96\times10^2\right)\times10^3 && \text{Here a=796 which is greater than 10,therefore write } 796=7.96\times10^2\\ &= 7.96\times10^2\times10^3 && \text{Drop the parenthesis}\\ &= 7.96\times10^{2+3} && \text{Bases are same exponents are added}\\ &= 7.96\times10^5 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{796\times10^3=7.96\times10^5}$

Answer 33PT.

By the square of sum property for any two numbers *x* and *y*, $(x+y)^2=x^2+2xy+y^2$

Since it is given that $x^2+2xy+y^2=8$, so $(x+y)^2=8$.

And hence

$$\begin{aligned}3(x+y)^2 &= 3\cdot8\\ &= 24\end{aligned}$$

Thus the correct option is C.

Answer 34E.

To express 0.0343×10^{-2} in the scientific notation, use the propertythat a number is expressed in scientific notation when it is written as a product of a factor and a power of 10. The factor must be greater than or equal to 1 and less than 10, that is

$a\times10^n$, where $1\le a<10$ and n is an integer

$$\begin{aligned}0.0343\times10^{-2} &= \left(3.43\times10^{-2}\right)\times10^{-2} && \text{Move decimal two places to right so } a=3.43\\ &= 3.43\times10^{-2}\times10^{-2} && \text{Drop the parenthesis}\\ &= 3.43\times10^{-2-2} && \text{Bases are same exponents are added}\\ &= 3.43\times10^{-4} && \text{Here } a=3.43 \text{ and } n=-5\end{aligned}$$

Therefore $\boxed{0.0343\times10^{-2}=3.43\times10^{-4}}$

Answer 35E.

To express $(2\times10^5)(3\times10^6)$ in thescientific and standard notation, use the associative property which states that $a\times(b\times c)=(a\times b)\times c$ Where a, b and c are integers

$$
\begin{aligned}
&(2\times10^5)(3\times10^6)\\
&=(2\times3)(10^5\times10^6) && \text{Associative property}\\
&=6\times10^{5+6} && \text{Bases are same exponents are added}\\
&=6\times10^{11} && \text{In scientific notation with } a=6 \text{ and } n=11\\
&=6,000,000,000,00 && \text{Or in standard notation}
\end{aligned}
$$

Therefore

$$
\boxed{\begin{aligned}
(2\times10^5)(3\times10^6)&=6\times10^{11} && \text{Scientific notation}\\
&=6,000,000,000,00 && \text{Standard notaion}
\end{aligned}}
$$

Answer 36E.

To express $\frac{8.4\times10^{-6}}{1.4\times10^{-9}}$ in thescientific and standard notation, use the property that for any non zero number a and any integer n, $\frac{1}{a^{-n}}=a^n$

$$
\begin{aligned}
\frac{8.4\times10^{-6}}{1.4\times10^{-9}}&=\left(\frac{8.4}{1.4}\right)(10^{-6}\times10^{9}) && \text{Since } \frac{1}{a^{-n}}=a^n\\
&=6\times10^{-6}\times10^{9} && \text{As } \frac{8.4}{1.4}=6\\
&=6\times10^{-6+9} && \text{Bases are same exponents are added}\\
&=6\times10^{3} && \text{which is in scientific notation with } a=6 \text{ and n=3}\\
&=6,000 && \text{Standard notation}
\end{aligned}
$$

Therefore

$$
\boxed{\begin{aligned}
\frac{8.4\times10^{-6}}{1.4\times10^{-9}}&=6\times10^{3} && \text{Scientific notation}\\
&=6,000 && \text{Standard notaion}
\end{aligned}}
$$

Answer 37E.

To express $\left(3\times10^{2}\right)\left(5.6\times10^{-8}\right)$ in thescientific and standard notation, use the property that for any non zero numbera and any integer n, $\frac{1}{a^{-n}}=a^{n}$

$\left(3\times10^{2}\right)\left(5.6\times10^{-8}\right)$

$=\left(3\times5.6\right)\left(10^{2}\times10^{-8}\right)$

$=16.8\times10^{2+(-8)}$ Bases are same exponents are added

$=\left(1.68\times10^{1}\right)\times10^{-6}$ write $16.8=1.68\times10$

Bases are same exponents are added

$=1.68\times10^{1+(-6)}$

$=1.68\times10^{-5}$ which is in scientific notation with $a=1.68$ and $n=-5$

$=0.0000168$ Move decimal point 5 places to left

$=0.0000168$ Standard notation

Therefore

$\left(3\times10^{2}\right)\left(5.6\times10^{-8}\right)=1.68\times10^{-5}$	Scientific notation
$=0.0000168$	Standard notaion

Answer 38E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are two variables n and *p* and the sum of powers of *n* and *p* in different terms is 1 and 2. As the highest sum is 2 for the term $2p^{2}$.

<u>So the degree of the polynomial is 2</u>

Answer 39E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are two variables n and *t* and the sum of powers of *n* and *t* in different terms is 2 and 4. As the highest sum is 4 for the term $17n^{2}t^{2}$.

<u>So the degree of the polynomial is 4</u>

Answer 40E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are five variables *x,y,z,r* and *s* and the sum of powers of *x,y,z,r* and *s* in different terms is 2,5 and 4. As the highest sum is 5 for the term $9x^3z^2$.

So the degree of the polynomial is 5

Answer 41E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are two variables *x* and*y* and the sum of powers of *x*and *y*in different terms is 6,4,0 and 2. As the highest sum is 6 for the term $-6x^5y$.

So the degree of the polynomial is 6

Answer 42E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are two variables *a*and*b* and the sum of powers of *a*and *b*in different terms is 4,4 and 2. As the highest sum is 4which is for the two terms $3ab^3\ and\ -5a^2b^2$.

So the degree of the polynomial is 4

Answer 43E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are two variables *m*and*n* and the sum of powers of *m*and *n*in different terms is 7 and 6. As the highest sum is 7which is for theterm $19m^3n^4$.

So the degree of the polynomial is 7

Answer 44E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there is only one variable *x* and the sum of powers of *x* in different terms is 4,1,2 and 0. As the highest sum is 4 for the term3*x*4 .

So the degree of the polynomial is 4.

Now write the term with highest power of *x* that is 4, first which is 3x4 then the term with power 3 of *x* which is not present, as the term with power 2 of *x* is x2, write the term with power 1 of *x* which is –*x*and at last write the term which is without *x* that is -5.

So in descending powers of x, given polynomial can be written as $3x^4+x^2-x-5$

Therefore in descending powers of *x* the polynomial can be written as $\boxed{3x^4+x^2-x-5}$

Answer 45E.

The degree of a polynomial is the highest sum of the powers that appear on variables in terms of the polynomial. In the given polynomial there are two variables*x* and*y* and the sum of powers of *x*and*y* in different terms is 5,0,4,2 and 5. As the highest sum is 5 for the two terms-2x2y3 and 5x3y2.

So the degree of the polynomial is 5.

Now write the term with highest power of *x* that is 4, first which is -4x4 then the term with power 3 of *x* is 5*x*3*y*2, as the term with power 2 of *x* is -2x2 y3, write the term with power 1 of *x* which is *xy*and at last write the term which is without *x* that is -27.

Therefore in descending powers of *x* the polynomial can be written as

$\boxed{-4x^4+5x^3y^2-2x^2y^3+xy-27}$

Answer 46E.

Given polynomials are $2x^2-5x+7$ and $3x^3+x^2+2$, to add or subtract the polynomials note that like terms are added or subtracted depending on their sign. Group the like terms in the following way

$$\begin{aligned}
&\left(2x^2-5x+7\right)-\left(3x^3+x^2+2\right) && \text{change sign of each-}\\
&=2x^2-5x+7-3x^3-x^2-2 && \text{term in second polynomial}\\
&=\left(-3x^3\right)+\left(2x^2-x^2\right)+\left(-5x\right)+\left(7-2\right) && \text{group like terms}\\
&=-3x^3+x^2-5x+5 && \text{simplify each term in parenthesis}
\end{aligned}$$

Hence $\boxed{\left(2x^2-5x+7\right)-\left(3x^3+x^2+2\right)=-3x^3+x^2-5x+5}$

Answer 47E.

Given polynomials are $x^2 - 6xy + 7y^2$ and $3x^2 + xy - y^2$, to add or subtract polynomials note that like terms are added or subtracted depending on their sign. Group the like terms in the following way

$$\begin{aligned}
&(x^2 - 6xy + 7y^2) + (3x^2 + xy - y^2) \\
&= x^2 - 6xy + 7y^2 + 3x^2 + xy - y^2 && \text{Drop the parenthesis} \\
&= (x^2 + 3x^2) + (7y^2 - y^2) + (-6xy + xy) && \textit{Group like terms} \\
&= 4x^2 + 6y^2 - 5xy && \text{Simplify each term in parenthesis}
\end{aligned}$$

Hence $\boxed{(x^2 - 6xy + 7y^2) + (3x^2 + xy - y^2) = 4x^2 + 6y^2 - 5xy}$

Answer 48E.

Given polynomials are $7z^2 + 4$ and $3z^2 + 2z - 6$, to add or subtract polynomials note that like terms are added or subtracted depending on their sign. Group the like terms in the following way

$$\begin{aligned}
&(7z^2 + 4) - (3z^2 + 2z - 6) && \text{change sign of each-} \\
&= 7z^2 + 4 - 3z^2 - 2z + 6 && \text{term in second polynomial} \\
&= (7z^2 - 3z^2) + (-2z) + (4 + 6) && \text{group like terms} \\
&= 4z^2 - 2z + 10 && \text{simplify each term in parenthesis}
\end{aligned}$$

Hence $\boxed{(7z^2 + 4) - (3z^2 + 2z - 6) = 4z^2 - 2z + 10}$

Answer 49E.

Given polynomials are $13m^4 - 7m - 10$ and $8m^4 - 3m + 9$, to add or subtract polynomials note that like terms are added or subtracted depending on their sign. Group the like terms in the following way

$$\begin{aligned}
&(13m^4 - 7m - 10) + (8m^4 - 3m + 9) \\
&= 13m^4 - 7m - 10 + 8m^4 - 3m + 9 && \text{Drop the parenthesis} \\
&= (13m^4 + 8m^4) + (-7m - 3m) + (-10 + 9) && \textit{Group like terms} \\
&= 21m^4 - 10m - 1 && \text{Simplify each term in parenthesis}
\end{aligned}$$

Hence $\boxed{(13m^4 - 7m - 10) + (8m^4 - 3m + 9) = 21m^4 - 10m - 1}$

Answer 50E.

Given polynomials are $11m^2n^2+4mn-6$ and $5m^2n^2+6mn+17$, to add or subtract polynomials note that like terms are added or subtracted depending on their sign. Group the like terms in the following way

$$\left(11m^2n^2+4mn-6\right)+\left(5m^2n^2+6mn+17\right)$$

$=11m^2n^2+4mn-6+5m^2n^2+6mn+17$ Drop the parenthesis

$=\left(11m^2n^2+5m^2n^2\right)+\left(4mn+6mn\right)+\left(-6+17\right)$ Group like terms

$=16m^2n^2+10mn+11$ Simplify each term in parenthesis

Hence $\boxed{\left(11m^2n^2+4mn-6\right)+\left(5m^2n^2+6mn+17\right)=16m^2n^2+10mn+11}$

Answer 51E.

Given polynomials are $-5p^2+3p+49$ and $2p^2+5p+24$, to add or subtract the polynomials note that like terms are added or subtracted depending on their sign. Group the like terms in the following way

$\left(-5p^2+3p+49\right)-\left(2p^2+5p+24\right)$ change sign of each-

$=-5p^2+3p+49-2p^2-5p-24$ term in second polynomial

$=\left(-5p^2-2p^2\right)+\left(3p-5p\right)+\left(49-24\right)$ group like terms

$=-7p^2-2p+25$ simplify each term in parenthesis

Hence $\boxed{\left(-5p^2+3p+49\right)-\left(2p^2+5p+24\right)=-7p^2-2p+25}$

Answer 52E.

To simplify the given polynomial $b(4b-1)+10b$ use the distributive property that is

$a(b+c)=ab+bc$, where a,b,c are integers

$b(4b-1)+10b=b(4b)+b(-1)+10b$ Distributive property

$=4b^2-b+10b$ Multiply

$=4b^2+9b$ Combine like terms

Therefore $\boxed{b(4b-1)+10b=4b^2+9b}$

Answer 53E.

To simplify the given polynomial $x(3x-5)+7(x^2-2x+9)$ use the distributive property that is $a(b+c)=ab+bc$, where a,b,c are integers

$$x(3x-5)+7(x^2-2x+9)=x(3x)+x(-5)+7(x^2)+7(-2x)+7(9) \quad \text{Distributive property}$$
$$=3x^2-5x+7x^2-14x+63 \quad \text{Multiply}$$
$$=(3x^2+7x^2)+(-5x-14x)+63 \quad \text{Combine like terms}$$
$$=10x^2-19x+63 \quad \text{Simplify}$$

Therefore $\boxed{x(3x-5)+7(x^2-2x+9)=10x^2-19x+63}$

Answer 54E.

To simplify the given polynomial $8y(11y^2-2y+13)-9(3y^3-7y+2)$ use the distributive property that is $a(b+c)=ab+bc$, where a,b,c are integers

$$8y(11y^2-2y+13)-9(3y^3-7y+2)$$
$$=8y(11y^2)+8y(-2y)+8y(13)-9(3y^3)-9(-7y)-9(2) \quad \text{Distributive property}$$
$$=88y^3-16y^2+104y-27y^3+63y-18 \quad \text{Multiply}$$
$$=(88y^3-27y^3)-16y^2+(104y+63y)-18 \quad \text{Combine like terms}$$
$$=61y^3-16y^2+167y-18 \quad \text{Simplify}$$

Therefore $\boxed{8y(11y^2-2y+13)-9(3y^3-7y+2)=61y^3-16y^2+167y-18}$

Answer 55E.

To simplify the given polynomial $2x(x-y^2+5)-5y^2(3x-2)$ use the distributive property that is $a(b+c)=ab+bc$, where a,b,c are integers

$$2x(x-y^2+5)-5y^2(3x-2)$$
$$=2x(x)+2x(-y^2)+2x(5)-5y^2(3x)-5y^2(-2) \quad \text{Distributive property}$$
$$=2x^2-2xy^2+10x-15xy^2+10y^2 \quad \text{Multiply}$$
$$=2x^2+(-2xy^2-15xy^2)+10y^2+10x \quad \text{Combine like terms}$$
$$=2x^2-17xy^2+10y^2+10x \quad \text{Simplify}$$

Therefore $\boxed{2x(x-y^2+5)-5y^2(3x-2)=2x^2-17xy^2+10y^2+10x}$

Answer 56E.

To simplify the given polynomial $m(2m-5)+m=2m(m-6)+16$ use the distributive property that is $a(b+c)=ab+bc$, where a,b,c are integers

$$m(2m-5)+m=2m(m-6)+16 \quad \text{Original equation}$$
$$m(2m)+m(-5)+m=2m(m)+2m(-6)+16 \quad \text{Distributive property}$$
$$2m^2-5m+m=2m^2-12m+16 \quad \text{Multiply}$$
$$2\text{m}^2+-4m=2m^2-12m+16 \quad \text{Combine like terms}$$

Subtract 2m2from each side

$$2m^2-4m-2m^2=2m^2-12m+16-2m^2$$
$$-4m=-12m+16$$
$$-4m+12m=-12m+16+12m \quad \text{Add 12m from each side}$$
$$8\text{m} = 16 \quad \text{Simplify}$$
$$m=2$$ Divide each side by 8

Therefore $\boxed{m=2}$

Answer 57E.

To simplify the given polynomial $2(3w+w^2)-6=2w(w-4)+10$ use the distributive property that is $a(b+c)=ab+bc$, where a,b,c are integers

$$2(3w+w^2)-6=2w(w-4)+10 \quad \text{Original equation}$$
$$2(3w)+2(w^2)-6=2w(w)+2w(-4)+10 \quad \text{Distributive property}$$
$$6w+2w^2-6=2w^2-8w+10 \quad \text{Multiply}$$
$$6\text{w}-6 = -8\text{w}+10 \quad \text{Subtract } 2\text{w}^2 \text{from each side}$$

Add $8w$ from each side

$$14w-6=10$$
$$14w=16 \quad \text{Add 6 from each side}$$
$$\text{w} = \frac{16}{14} \quad \text{Divide each side by14}$$
$$\text{w} = \frac{8}{7} \quad \text{As } \frac{16}{14} = \frac{8}{7}$$

Therefore $\boxed{w=\frac{8}{7}}$

Answer 58E.

To simplify the given polynomial $(r-3)(r+7)$ use the distributive property that is

$a(b+c)=ab+bc$, where a,b,c are integers

$$
\begin{aligned}
(r-3)(r+7) &= r(r+7)-3(r+7) && \text{Distributive property} \\
&= r(r)+r(7)-3(r)-3(7) && \text{Distributive property} \\
&= r^2+7r-3r-21 && \text{Multiply} \\
&= r^2+4r-21 && \text{Simplify}
\end{aligned}
$$

Therefore $\boxed{(r-3)(r+7)=r^2+4r-21}$

Answer 59E.

To simplify the given polynomial $(4a-3)(a+4)$ use the distributive property that is

$a(b+c)=ab+bc$, where a,b,c are integers

$$
\begin{aligned}
(4a-3)(a+4) &= 4a(a+4)-3(a+4) && \text{Distributive property} \\
&= 4a(a)+4a(4)-3(a)-3(4) && \text{Distributive property} \\
&= 4a^2+16a-3a-12 && \text{Multiply} \\
&= 4a^2+13a-12 && \text{Simplify}
\end{aligned}
$$

Therefore $\boxed{(4a-3)(a+4)=4a^2+13a-12}$

Answer 60E.

To simplify the given polynomial $(3x+0.25)(6x-0.5)$ use the distributive property that is

$a(b+c)=ab+bc$, where a,b,c are integers

$$
\begin{aligned}
(3x+0.25)(6x-0.5) &= 3x(6x-0.5)+0.25(6x-0.5) && \text{Distributive property} \\
&= 3x(6x)+3x(-0.5)+0.25(6x)+0.25(-0.5) && \text{Distributive property} \\
&= 18x^2-1.5x+1.5x-0.125 && \text{Multiply} \\
&= 18x^2-0.125 && \text{Simplify}
\end{aligned}
$$

Therefore $\boxed{(3x+0.25)(6x-0.5)=18x^2-0.125}$

Answer 61E.

To simplify the given polynomial $(5r-7s)(4r+3s)$ use the distributive property that is

$a(b+c)=ab+bc$, where a,b,c are integers

$$
\begin{aligned}
(5r-7s)(4r+3s) &= 5r(4r+3s)-7s(4r+3s) && \text{Distributive property} \\
&= 5r(4r)+5r(3s)-7s(4r)-7s(3s) && \text{Distributive property} \\
&= 20r^2+15rs-28rs-21s^2 && \text{Multiply} \\
&= 20r^2-21s^2-13rs && \text{Simplify}
\end{aligned}
$$

Therefore $\boxed{(5r-7s)(4r+3s)=20r^2-21s^2-13rs}$

Answer 62E.

To simplify the given polynomial $(2k+1)(k^2+7k-9)$ use the distributive property that is

$a(b+c)=ab+bc$, where a,b,c are integers

$$\begin{aligned}(2k+1)(k^2+7k-9)&=2k(k^2+7k-9)+1(k^2+7k-9) && \text{Distributive property}\\ &=2k(k^2)+2k(7k)+2k(-9)+(k^2+7k-9) && \text{Distributive property}\\ &=2k^3+14k^2-18k+k^2+7k-9 && \text{Multiply}\\ &=2k^3+15k^2-11k-9 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{(2k+1)(k^2+7k-9)=2k^3+15k^2-11k-9}$

Answer 63E.

To simplify the given polynomial $(4p-3)(3p^2-p+2)$ use the distributive property that is

$a(b+c)=ab+bc$, where a,b,c are integers

$$\begin{aligned}&(4p-3)(3p^2-p+2)\\ &=4p(3p^2-p+2)-3(3p^2-p+2) && \text{Distributive property}\\ &=4p(3p^2)+4p(-p)+4p(2)-3(3p^2)-3(-p)-3(2) && \text{Distributive property}\\ &=12p^3-4p^2+8p+-9p^2+3p-6 && \text{Multiply}\\ &=12p^3-13p^2+11p-6 && \text{Combine like terms}\end{aligned}$$

Therefore $\boxed{(4p-3)(3p^2-p+2)=12p^3-13p^2+11p-6}$

Answer 64E.

To simplify the given polynomial $(x-6)(x+6)$ use the fact that product of a sum and a difference $(a+b)(a-b)=(a-b)(a+b)=a^2-b^2$

$$\begin{aligned}(x-6)(x+6)&=(x)^2-(6)^2 && \text{Product of a sum and difference}\\ &=x^2-36 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{(x-6)(x+6)=x^2-36}$

Answer 65E.

To simplify the given polynomial $(4x+7)^2$ use the fact that square of a sum

$(a+b)^2=a^2+2ab+b^2$

$$\begin{aligned}(4x+7)^2&=(4x)^2+2(4x)(7)+(7)^2 && \text{Square of a sum}\\ &=16x^2+56x+49 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{(4x+7)^2=16x^2+56x+49}$

Answer 66E.

To simplify the given polynomial $(8x-5)^2$ use the fact that square of a difference:

$(a-b)^2 = a^2 - 2ab + b^2$

$$\begin{aligned}(8x-5)^2 &= (8x)^2 - 2(8x)(5) + (5)^2 && \text{Square of a difference}\\ &= 64x^2 - 80x + 25 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{(8x-5)^2 = 64x^2 - 80x + 25}$

Answer 67E.

To simplify the given polynomial $(5x-3y)(5x+3y)$ use the fact that product of a sum and a difference $(a+b)(a-b) = (a-b)(a+b) = a^2 - b^2$

$$\begin{aligned}(5x-3y)(5x+3y) &= (5x)^2 - (3y)^2 && \text{Product of a sum and difference}\\ &= 25x^2 - 9y^2 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{(5x-3y)(5x+3y) = 25x^2 - 9y^2}$

Answer 68E.

To simplify the given polynomial $(6a-5b)^2$ use the fact that square of a difference:

$(a-b)^2 = a^2 - 2ab + b^2$

$$\begin{aligned}(6a-5b)^2 &= (6a)^2 - 2(6a)(5b) + (5b)^2 && \text{Square of a difference}\\ &= 36a^2 - 60ab + 25b^2 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{(6a-5b)^2 = 36a^2 - 60ab + 25b^2}$

Answer 69E.

To simplify the given polynomial $(3m+4n)^2$ use the fact that square of a sum

$(a+b)^2 = a^2 + 2ab + b^2$

$$\begin{aligned}(3m+4n)^2 &= (3m)^2 + 2(3m)(4n) + (4n)^2 && \text{Square of a sum}\\ &= 9m^2 + 24mn + 16n^2 && \text{Simplify}\end{aligned}$$

Therefore $\boxed{(3m+4n)^2 = 9m^2 + 24mn + 16n^2}$