Chapter 3. Solving Linear Equations

Ex. 3.7

Answer 1CU.

A quantity that shows the change in percent form, in the old value of a quantity is known as percent of change.

Depending on the nature of change in the old value, the percent of change is classified into two types:-

1. Percent of increase

2. Percent of decrease

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

The similarity between both percent of increase and percent of decrease is that both the quantities are expressed as percentages. Both are calculated with respect to the original value.

The contrast between them is that one expresses the increase in original value while the other expresses the decrease in the original value.

Answer 1PQ.

Write the following equation;

$$-3x-7=18$$

The objective is to solve the equation and find the value of *x*.

Add 7 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}-3x-7&=18\\-3x-7+7&=18+7\\-3x&=25\end{aligned}$$

Divide both sides of the equation by -3 and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}\frac{-3x}{-3}&=\frac{25}{-3}\\x&=-\frac{25}{3}\end{aligned}$$

Therefore, the equation $-3x-7=18$ has the solution $\boxed{x=-\frac{25}{3}}$.

Check the solution.

So, substitute $-\frac{25}{3}$ for *x* on the left hand side of the equation $-3x-7=18$;

Simplify the expression

$$\begin{aligned}-3x-7&=-3\left(-\frac{25}{3}\right)-7\\&=25-7\\&=18\end{aligned}$$

The right hand side of the equation $-3x-7=18$ is 18.

Thus, the right and the left hand sides of the equation give the same value for $x=-\frac{25}{3}$.

Hence, the result is verified.

Answer 2CU.

A quantity that shows the change in percent form, in the old value of a quantity is known as percent of change.

Depending on the nature of change in the old value, the percent of change is classified into two types:-

1. Percent of increase

2. Percent of decrease

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase. It is calculated using the following formula;

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

The percent of change can be greater than 100%.

Consider the following example;

Suppose the original number is 20 and the new number is 400.

Find the percent of change.

Observe that the new value is greater than the original value.

Hence, it is a case of percent of increase.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= 400 - 20\\ &= 380\end{aligned}$$

Substitute 380 for change in value and 20 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

$$\frac{380}{20} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{380}{20}=\frac{r}{100}$$
$$380\cdot 100=r\cdot 20$$
$$38000=20r$$
$$20r=38000$$

Divide both sides of the equation by 20;

$$\frac{20r}{20}=\frac{38000}{20}$$
$$r=1900$$

The percent of change is 1900%.

Thus, the percent of change is greater than 100%.

Answer 2PQ.

Write the following equation;

$$5=\frac{m-5}{4}$$

The objective is to solve the equation and find the value of m.

Multiply by 4 on both sides of the equation;

Simplify the equation

$$4\cdot 5=4\cdot\frac{m-5}{4}$$
$$20=m-5$$

Add 5 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$20=m-5$$
$$20+5=m-5+5$$
$$25=m$$
$$m=25$$

Therefore, the equation $5=\frac{m-5}{4}$ has the solution $\boxed{m=25}$.

Check the solution.

So, substitute 25 for m on the right hand side of the equation $5=\frac{m-5}{4}$;

Simplify the expression

$$\begin{aligned}\frac{m-5}{4}&=\frac{25-5}{4}\\&=\frac{20}{4}\\&=5\end{aligned}$$

The left hand side of the equation $5=\frac{m-5}{4}$ is 5.

Thus, the right and the left hand sides of the equation give the same value for $m=25$.

Hence, the result is verified.

Answer 2RM.

The score of Ms. *C* in the first test is 75 out of 100.

Her score in the last test is 94 out of 100.

The objective is to find the percent of increase.

Use the following proportion to find the percent of increase;

$$\frac{\text{difference}}{\text{original value}}=\frac{\%}{100}$$

Suppose *r* is the percent of increase.

So, write the proportion as follows;

$$\frac{\text{difference}}{\text{original value}}=\frac{r}{100}$$

The increase in score is from 75 to 94.

Hence consider the original value as 75 and the new value as 94.

Find the difference as follows;

$$\begin{aligned}\text{difference}&=\text{new value}-\text{original value}\\&=94-75\\&=19\end{aligned}$$

Hence the original number is $\boxed{75}$ and the amount of change is the difference which is $\boxed{19}$.

Substitute 19 for difference and 75 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\begin{aligned}\frac{\text{difference}}{\text{original value}}&=\frac{r}{100}\\\frac{19}{75}&=\frac{r}{100}\end{aligned}$$

Cross multiply the terms and form the following equation;

$$\frac{19}{75}=\frac{r}{100}$$
$$19\cdot 100 = r\cdot 75$$
$$1900 = 75r$$
$$75r = 1900$$

Divide both sides of the equation by 75;

$$\frac{75r}{75}=\frac{1900}{75}$$
$$r = 25.3333$$

Round up the value of r to the nearest whole number.

So write the value of r as 25.

The percent of change is 25%.

Therefore, score of Ms. *C* in the test increased by about $\boxed{25\%}$.

Answer 3CU.

The original number is 20.

The new number is 30.

The objective is to detect the error created by one of the person during calculation.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new number, 30, is greater than the original number, 20.

Hence, the percent of change is percent of increase.

Use the following proportion to find the percent of change;

$$\frac{\text{amount of change}}{\text{original number}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the amount of change as follows;

$$\begin{aligned}\text{amount of change} &= \text{new number} - \text{original number}\\ &= 30-20\\ &= 10\end{aligned}$$

Substitute 10 for amount of change and 20 for original number in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{amount of change}}{\text{original number}}=\frac{r}{100}$$
$$\frac{10}{20}=\frac{r}{100}$$

Both person *L* and *C* have calculated the amount of change correctly.

The change is in the original number hence the ratio is taken as the amount of change to the original number.

Thus person *L* has written the correct proportion.

Person *C* has taken the ratio of amount of change to the new number 30 thus making a mistake.

Therefore, $\boxed{\text{person } L}$ is correct.

Answer 3PQ.

Write the following equation;

$$4h+5=11$$

The objective is to solve the equation and find the value of *h*.

Subtract 5 from both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned} 4h+5&=11\\ 4h+5-5&=11-5\\ 4h&=6 \end{aligned}$$

Divide both sides of the equation by 4 and rewrite the equation as follows;

Reduce the fraction to the lowest form

$$\begin{aligned} \frac{4h}{4}&=\frac{6}{4}\\ h&=\frac{3}{2} \end{aligned}$$

Therefore, the equation $4h+5=11$ has the solution $\boxed{h=\frac{3}{2}}$.

Check the solution.

So, substitute $\frac{3}{2}$ for *h* on the left hand side of the equation $4h+5=11$;

Simplify the expression

$$\begin{aligned} 4h+5&=4\left(\frac{3}{2}\right)+5\\ &=6+5\\ &=11 \end{aligned}$$

The right hand side of the equation $4h+5=11$ is 11.

Thus, the right and the left hand sides of the equation give the same value for $h=\frac{3}{2}$.

Hence, the result is verified.

Answer 3RM.

The production of the catalog center in the beginning is 12 orders per hour.

The production after offering the incentive is 18 orders per hour.

The objective is to find the percent of increase.

Use the following proportion to find the percent of increase;

$$\frac{\text{difference}}{\text{original value}} = \frac{\%}{100}$$

Suppose r is the percent of increase.

So, write the proportion as follows;

$$\frac{\text{difference}}{\text{original value}} = \frac{r}{100}$$

The increase in production is from 12 to 18.

Hence consider the original value as 12 and the new value as 18.

Find the difference as follows;

$$\begin{aligned}\text{difference} &= \text{new value} - \text{original value}\\ &= 18 - 12\\ &= 6\end{aligned}$$

Hence the original number is $\boxed{12}$ and the amount of change is the difference which is $\boxed{6}$.

Substitute 6 for difference and 12 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{difference}}{\text{original value}} = \frac{r}{100}$$

$$\frac{6}{12} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\begin{aligned}\frac{6}{12} &= \frac{r}{100}\\ 6 \cdot 100 &= r \cdot 12\\ 600 &= 12r\\ 12r &= 600\end{aligned}$$

Divide both sides of the equation by 12;

$$\begin{aligned}\frac{12r}{12} &= \frac{600}{12}\\ r &= 50\end{aligned}$$

The percent of change is 50%.

Therefore, there was an $\boxed{50\%}$ increase in the production of the center.

Answer 4CU.

The original value of the product is 72.

The new value of the product is 36.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 36, is less than the original value, 72.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= 72 - 36\\ &= 36\end{aligned}$$

Substitute 36 for change in value and 72 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

$$\frac{36}{72} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\begin{aligned}\frac{36}{72} &= \frac{r}{100}\\ 36 \cdot 100 &= r \cdot 72\\ 3600 &= 72r\\ 72r &= 3600\end{aligned}$$

Divide both sides of the equation by 72;

$$\begin{aligned}\frac{72r}{72} &= \frac{3600}{72}\\ r &= 50\end{aligned}$$

The percent of change is 50%.

Therefore, the percent of decrease in the original value is $\boxed{50\%}$.

Answer 4PQ.

Write the following equation;

$$5d-6=3d+9$$

The objective is to solve the equation and find the value of *d*.

Subtract $3d$ from both sides of the equation and rewrite the equation as follows;

Collect the like terms

Simplify the equation

$$\begin{aligned}5d-6&=3d+9\\5d-6-3d&=3d+9-3d\\5d-3d-6&=3d-3d+9\\2d-6&=9\end{aligned}$$

Add 6 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}2d-6&=9\\2d-6+6&=9+6\\2d&=15\end{aligned}$$

Divide both sides of the equation by 2 and rewrite the equation as follows;

$$\begin{aligned}\frac{2d}{2}&=\frac{15}{2}\\d&=\frac{15}{2}\end{aligned}$$

Therefore, the equation $5d-6=3d+9$ has the solution $\boxed{d=\frac{15}{2}}$.

Check the solution.

So, substitute $\frac{15}{2}$ for *d* on the left hand side of the equation $5d-6=3d+9$;

Simplify the expression

$$\begin{aligned}5d-6&=5\left(\frac{15}{2}\right)-6\\&=\frac{75}{2}-6\\&=\frac{75-12}{2}\\&=\frac{63}{2}\end{aligned}$$

Substitute $\frac{15}{2}$ for d on the right hand side of the equation $5d-6=3d+9$;

Simplify the expression

$$\begin{aligned}3d+9&=3\left(\frac{15}{2}\right)+9\\&=\frac{45}{2}+9\\&=\frac{45+18}{2}\\&=\frac{63}{2}\end{aligned}$$

Thus, the right and the left hand sides of the equation give the same value for $d=\frac{15}{2}$.

Hence, the result is verified.

Answer 5CU.

The original value of the product is 45.

The new value of the product is 50.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 50, is greater than the original value, 45.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value}&=\text{new value}-\text{original value}\\&=50-45\\&=5\end{aligned}$$

Substitute 5 for change in value and 45 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\begin{aligned}\frac{\text{change in value}}{\text{original value}}&=\frac{r}{100}\\\frac{5}{45}&=\frac{r}{100}\end{aligned}$$

Cross multiply the terms and form the following equation;

$$\frac{5}{45}=\frac{r}{100}$$
$$5\cdot 100 = r\cdot 45$$
$$500 = 45r$$
$$45r = 500$$

Divide both sides of the equation by 45;

$$\frac{45r}{45}=\frac{500}{45}$$
$$r = 11.11$$

Round up the value of *r* to the nearest whole number.

So write the value of *r* as 11.

The percent of change is 11%.

Therefore, the percent of increase in the original value is $\boxed{11\%}$.

Answer 5PQ.

Write the following equation;

$$7+2(w+1)=2w+9$$

The objective is to solve the equation and find the value of *w*.

Use distributive property to open the parenthesis.

The distributive property for three numbers *a*, *b* and *c* is as follows;

$$(a\pm b)\cdot c = a\cdot c \pm b\cdot c$$

So, rewrite the equation as follows;

Combine the like terms

Simplify the equation

$$7+2(w+1)=2w+9$$
$$7+2\cdot w+2\cdot 1=2w+9$$
$$7+2w+2=2w+9$$
$$9+2w=2w+9$$

The commutative property for addition of real numbers states that; for any two numbers *a* and *b*;

$$a+b=b+a$$

Hence, for all numbers *w*;

$$9+2w=2w+9$$

Therefore, the equation $7+2(w+1)=2w+9$ has the solution as $\boxed{\text{all numbers}}$.

Check the solution for any one number say 1

So, substitute 1 for *w* on the left hand side of the equation $7+2(w+1)=2w+9$;

Simplify the expression

$$\begin{aligned}7+2(w+1)&=7+2(1+1)\\&=7+2(2)\\&=7+4\\&=11\end{aligned}$$

Substitute 1 for *w* on the right hand side of the equation $7+2(w+1)=2w+9$;

Simplify the expression

$$\begin{aligned}2w+9&=2(1)+9\\&=2+9\\&=11\end{aligned}$$

Thus, the right and the left hand sides of the equation give the same value for $w=1$.

Same is true for any real number.

Hence, the result is verified.

Answer 6CU.

The original value of the product is 14.

The new value of the product is 16.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 16, is greater than the original value, 14.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 16 - 14\\ &= 2\end{aligned}$$

Substitute 2 for change in value and 14 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

$$\frac{2}{14} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\begin{aligned}\frac{2}{14} &= \frac{r}{100}\\ 2 \cdot 100 &= r \cdot 14\\ 200 &= 14r\\ 14r &= 200\end{aligned}$$

Divide both sides of the equation by 14;

$$\begin{aligned}\frac{14r}{14} &= \frac{200}{14}\\ r &= 14.29\end{aligned}$$

Round up the value of r to the nearest whole number.

So write the value of r as 14.

The percent of change is 14%.

Therefore, the percent of increase in the original value is $\boxed{14\%}$.

Answer 6PQ.

Write the following equation;

$$-8(4+9r)=7(-2-11r)$$

The objective is to solve the equation and find the value of *r*.

Use distributive property to open the parenthesis.

The distributive property for three numbers *a*, *b* and *c* is as follows;

$$(a\pm b)\cdot c=a\cdot c\pm b\cdot c$$

So, rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}-8(4+9r)&=7(-2-11r)\\-8\cdot 4+(-8)\cdot 9r&=7\cdot(-2)-7\cdot(11r)\\-32-72r&=-14-77r\end{aligned}$$

Add $77r$ to both sides of the equation and rewrite the equation as follows;

Combine the like terms

$$\begin{aligned}-32-72r&=-14-77r\\-32-72r+77r&=-14-77r+77r\\-32+5r&=-14\end{aligned}$$

Add 32 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}-32+5r&=-14\\32-32+5r&=-14+32\\5r&=18\end{aligned}$$

Divide both sides of the equation by 5 and rewrite the equation as follows;

$$\begin{aligned}\frac{5r}{5}&=\frac{18}{5}\\r&=\frac{18}{5}\end{aligned}$$

Therefore, the equation $-8(4+9r)=7(-2-11r)$ has the solution $\boxed{r=\frac{18}{5}}$.

Check the solution.

So, substitute $\frac{18}{5}$ for r on the left hand side of the equation $-8(4+9r)=7(-2-11r)$;

Simplify the expression

$$\begin{aligned}-8(4+9r)&=-8\left(4+9\left(\frac{18}{5}\right)\right)\\&=-8\left(4+\frac{162}{5}\right)\\&=-8\left(\frac{182}{5}\right)\\&=\frac{-1456}{5}\end{aligned}$$

Substitute $\frac{18}{5}$ for r on the right hand side of the equation $-8(4+9r)=7(-2-11r)$;

Simplify the expression

$$\begin{aligned}7(-2-11r)&=7\left(-2-11\left(\frac{18}{5}\right)\right)\\&=7\left(-2-\frac{198}{5}\right)\\&=7\left(\frac{-208}{5}\right)\\&=\frac{-1456}{5}\end{aligned}$$

Thus, the right and the left hand sides of the equation give the same value for $r=\frac{18}{5}$.

Hence, the result is verified.

Answer 7CU.

The original value of the product is 150.

The new value of the product is 120.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 120, is less than the original value, 150.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= 150 - 120\\ &= 30\end{aligned}$$

Substitute 30 for change in value and 150 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

$$\frac{30}{150} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\begin{aligned}\frac{30}{150} &= \frac{r}{100}\\ 30 \cdot 100 &= r \cdot 150\\ 3000 &= 150r\\ 150r &= 3000\end{aligned}$$

Divide both sides of the equation by 150;

$$\begin{aligned}\frac{150r}{150} &= \frac{3000}{150}\\ r &= 20\end{aligned}$$

The percent of change is 20%.

Therefore, the percent of decrease in the original value is $\boxed{20\%}$.

Answer 7PQ.

Write the following proportion;

$$\frac{2}{10}=\frac{1}{a}$$

Cross multiply the terms;

$$\frac{2}{10}=\frac{1}{a}$$
$$2\cdot a=1\cdot 10$$

Carry out the multiplication and write the equation in terms of *a* as follows;

$$2\cdot a=1\cdot 10$$
$$2a=10$$

Divide both sides of the equations by 2;

$$\frac{2a}{2}=\frac{10}{2}$$
$$a=5$$

Therefore, the value of the variable in the proportion is $\boxed{a=5}$.

Answer 8CU.

The price of the software is $39.50

The sales tax on the software price is 6.5%.

The objective is to find the total price of the software.

The total price of the software is original price with the tax added to it.

So find the tax to be added.

The tax is 6.5% of the original price of the software.

So calculate 6.5% of $39.50.

Do the following calculation for tax;

$$\begin{aligned}6.5\%\text{ of }39.50&=\frac{6.5}{100}\times 39.50\\&=2.5675\end{aligned}$$

Round up the number to two decimal places.

Thus, the sales tax on the original price of the software is $2.57

Add the sales tax to the original price of the software.

$$\begin{aligned}\text{Total price} &= \text{original price} + \text{sales tax}\\ &= 39.50 + 2.57\\ &= 42.07\end{aligned}$$

Therefore, the total price of the software is $\boxed{\$42.07}$.

Answer 8PQ.

Write the following proportion;

$$\frac{3}{5} = \frac{24}{x}$$

Cross multiply the terms;

$$\frac{3}{5} = \frac{24}{x}$$
$$3 \cdot x = 24 \cdot 5$$

Carry out the multiplication and write the equation in terms of x as follows;

$$3 \cdot x = 24 \cdot 5$$
$$3x = 120$$

Divide both sides of the equations by 3;

$$\frac{3x}{3} = \frac{120}{3}$$
$$x = 40$$

Therefore, the value of the variable in the proportion is $\boxed{x = 40}$.

Answer 9CU.

The price of the compact disc is $15.99

The sales tax on the original price is 5.75%.

The objective is to find the total price of the compact disc.

The total price of the compact disc is original price with the tax added to it.

So find the tax to be added.

The tax is 5.75% of the original price of the compact disc.

So calculate 5.75% of $15.99.

Do the following calculation for tax;

$$\begin{aligned}5.75\% \text{ of } 15.99 &= \frac{5.75}{100} \times 15.99\\ &= 0.919425\end{aligned}$$

Round up the number to two decimal places.

Thus, the sales tax on the original price of the compact disc is $0.92

Add the sales tax to the original price of the compact disc.

$$\begin{aligned}\text{Total price} &= \text{original price} + \text{sales tax}\\ &= 15.99 + 0.92\\ &= 16.91\end{aligned}$$

Therefore, the total price of the compact disc is $\boxed{\$16.91}$.

Answer 9PQ.

Write the following proportion;

$$\frac{y}{4} = \frac{y+5}{8}$$

Cross multiply the terms;

$$\frac{y}{4} = \frac{y+5}{8}$$
$$y \cdot 8 = (y+5) \cdot 4$$

Use distributive property to open the parenthesis.

The distributive property for three numbers *a*, *b* and *c* is as follows;

$$(a \pm b) \cdot c = a \cdot c \pm b \cdot c$$

So, rewrite the equation as follows;

$$\begin{aligned}y \cdot 8 &= (y+5) \cdot 4\\ 8y &= y \cdot 4 + 5 \cdot 4\\ 8y &= 4y + 20\end{aligned}$$

Subtract $4y$ from both sides of the equation;

$$\begin{aligned}8y &= 4y + 20\\ 8y - 4y &= 4y + 20 - 4y\\ 4y &= 20\end{aligned}$$

Divide both sides of the equations by 4;

$$\begin{aligned}\frac{4y}{4} &= \frac{20}{4}\\ y &= 5\end{aligned}$$

Therefore, the value of the variable in the proportion is $\boxed{y = 5}$.

Answer 10CU.

The price of the jeans is $45.

The discount on the original price is 25%.

The objective is to find the price of the jeans after discount.

The price of the jeans after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 25% of the original price of the jeans.

So calculate 25% of $45.

Do the following calculation for discount;

$$\begin{aligned}25\%\text{ of }45 &= \frac{25}{100}\times 45\\ &= 11.25\end{aligned}$$

Thus, the discount on the original price of the jeans is $11.25

Subtract the discount price from the original price of the jeans.

$$\begin{aligned}\text{New price} &= \text{original price} - \text{discount}\\ &= 45 - 11.25\\ &= 33.75\end{aligned}$$

Therefore, the price of the jeans after discount is $\boxed{\$33.75}$.

Answer 10PQ.

The cost of the stamp in the year 1975 is 10 cents.

The cost of the stamp in the year 2001 is 34 cents.

The objective is to find the percent of increase.

Use the following proportion to find the percent of increase;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of increase.

The increase in the number of people is from 10 cents to 34 cents.

Hence consider the original value as 10 cents and the new value as 34 cents.

Find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 34 - 10\\ &= 24\end{aligned}$$

Substitute 24 for change in value and 10 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

$$\frac{24}{10} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\begin{aligned}\frac{24}{10} &= \frac{r}{100}\\ 24 \cdot 100 &= r \cdot 10\\ 2400 &= 10r\\ 10r &= 2400\end{aligned}$$

Divide both sides of the equation by 10;

$$\begin{aligned}\frac{10r}{10} &= \frac{2400}{10}\\ r &= 240\end{aligned}$$

The percent of change is 240%.

Therefore, the percent of increase in the price of the stamp is $\boxed{240\%}$.

Answer 11CU.

The price of the book is \$19.95.

The discount on the original price is 33%.

The objective is to find the price of the book after discount.

The price of the book after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 33% of the original price of the book.

So calculate 33% of \$19.95.

Do the following calculation for discount;

$$\begin{aligned}33\% \text{ of } 19.95 &= \frac{33}{100} \times 19.95\\ &= 6.5835\end{aligned}$$

Round up the number to two decimal places.

Thus, the discount on the original price of the book is \$6.58

Subtract the discount price from the original price of the book.

$$\begin{aligned}\text{New price} &= \text{original price} - \text{discount}\\ &= 19.95 - 6.58\\ &= 13.37\end{aligned}$$

Therefore, the price of the book after discount is $\boxed{\$13.37}$.

Answer 12CU.

The average income of a person with a bachelor's degree is $40,478.

The average income of a person with a high school diploma is $22,895.

The objective is to find an equation for the percent of increase from the average income of a person with high school diploma to that with a bachelor's degree.

Use the following proportion to find the equation for percent of increase;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of increase.

The increase in income is from the average income of a person with high school diploma to the average income of a person with bachelor's degree.

Hence consider the original value as the average income of a person with high school diploma and the new value as the average income of a person with a bachelor's degree.

Find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= \begin{pmatrix}\text{average income of a person}\\ \text{with a bachelor's degree}\end{pmatrix} - \begin{pmatrix}\text{average income of a person}\\ \text{with a high school diploma}\end{pmatrix}\end{aligned}$$

Rewrite the proportion as follows;

$$\frac{\begin{pmatrix}\text{average income of a person}\\ \text{with a bachelor's degree}\end{pmatrix} - \begin{pmatrix}\text{average income of a person}\\ \text{with a high school diploma}\end{pmatrix}}{\begin{pmatrix}\text{average income of a person}\\ \text{with a high school diploma}\end{pmatrix}} = \frac{r}{100}$$

Multiply by 100 on both sides of the equation;

$$\frac{\left(\begin{array}{c}\text{average income of a person}\\ \text{with a bachelor's degree}\end{array}\right)-\left(\begin{array}{c}\text{average income of a person}\\ \text{with a high school diploma}\end{array}\right)}{\left(\begin{array}{c}\text{average income of a person}\\ \text{with a high school diploma}\end{array}\right)}\cdot 100=\frac{r}{100}\cdot 100$$ Thus, write the equation to find the percent of increase as follows;

$$r=\frac{\left(\begin{array}{c}\text{average income of a person}\\ \text{with a bachelor's degree}\end{array}\right)-\left(\begin{array}{c}\text{average income of a person}\\ \text{with a high school diploma}\end{array}\right)}{\left(\begin{array}{c}\text{average income of a person}\\ \text{with a high school diploma}\end{array}\right)}\times 100$$

Answer 13CU.

The average income of a person with a bachelor's degree is $40,478.

The average income of a person with a high school diploma is $22,895.

The objective is to find the percent of increase from the average income of a person with high school diploma to that with a bachelor's degree.

Use the following proportion to find the equation for percent of increase;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of increase.

The increase in income is from the average income of a person with high school diploma to the average income of a person with bachelor's degree.

Hence consider the original value as the average income of a person with high school diploma and the new value as the average income of a person with a bachelor's degree.

Find the change in value as follows;

$$\begin{aligned}\text{change in value}&=\text{new value}-\text{original value}\\&=40,478-22,875\\&=17,583\end{aligned}$$

Substitute 17,583 for change in value and 22,875 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

$$\frac{17583}{22785}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{17583}{22785} = \frac{r}{100}$$
$$17583 \cdot 100 = r \cdot 22785$$
$$1758300 = 22785r$$
$$22785r = 1758300$$

Divide both sides of the equation by 22785;

$$\frac{22785r}{22785} = \frac{1758300}{22785}$$
$$r = 77.169$$

Round up the value of r to the nearest whole number.

So write the value of r as 77.

The percent of change is 77%.

Therefore, the percent of increase in the average income is about $\boxed{77\%}$.

Answer 14PA.

The original value of the product is 50.

The new value of the product is 70.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 70, is greater than the original value, 50.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 70 - 50\\ &= 20\end{aligned}$$

Substitute 20 for change in value and 50 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$
$$\frac{20}{50} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{20}{50} = \frac{r}{100}$$
$$20 \cdot 100 = r \cdot 50$$
$$2000 = 50r$$
$$50r = 2000$$

Divide both sides of the equation by 50;

$$\frac{50r}{50} = \frac{2000}{50}$$
$$r = 40$$

The percent of change is 40%.

Therefore, the percent of increase in the original value is $\boxed{40\%}$.

Answer 15PA.

The original value of the product is 25.

The new value of the product is 18.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 18, is less than the original value, 25.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= 25 - 18\\ &= 7\end{aligned}$$

Substitute 7 for change in value and 25 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$
$$\frac{7}{25} = \frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{7}{25}=\frac{r}{100}$$
$$7\cdot 100 = r\cdot 25$$
$$700 = 25r$$
$$25r = 700$$

Divide both sides of the equation by 25;

$$\frac{25r}{25}=\frac{700}{25}$$
$$r = 28$$

The percent of change is 28%.

Therefore, the percent of decrease in the original value is $\boxed{28\%}$.

Answer 16PA.

The original value of the product is 66.

The new value of the product is 30.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 30, is less than the original value, 66.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= 66-30\\ &= 36\end{aligned}$$

Substitute 36 for change in value and 66 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{36}{66}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{36}{66}=\frac{r}{100}$$
$$36\cdot 100 = r\cdot 66$$
$$3600 = 66r$$
$$66r = 3600$$

Divide both sides of the equation by 66;

$$\frac{66r}{66}=\frac{3600}{66}$$
$$r = 54.55$$

Round up the value of r to the nearest whole number.

So write the value of r as 55.

The percent of change is 55%.

Therefore, the percent of decrease in the original value is $\boxed{55\%}$.

Answer 17PA.

The original value of the product is 58.

The new value of the product is 152.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 152, is greater than the original value, 58.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 152-58\\ &= 94\end{aligned}$$

Substitute 94 for change in value and 58 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{94}{58}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{94}{58}=\frac{r}{100}$$
$$94\cdot 100 = r\cdot 58$$
$$9400 = 58r$$
$$58r = 9400$$

Divide both sides of the equation by 58;

$$\frac{58r}{58}=\frac{9400}{58}$$
$$r = 162.07$$

Round up the value of r to the nearest whole number.

So write the value of r as 162.

The percent of change is 162%.

Therefore, the percent of increase in the original value is $\boxed{162\%}$.

Answer 18PA.

The original value of the product is 13.7

The new value of the product is 40.2

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 40.2, is greater than the original value, 13.7.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 40.2 - 13.7\\ &= 26.5\end{aligned}$$

Substitute 26.5 for change in value and 13.7 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{26.5}{13.7}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{26.5}{13.7}=\frac{r}{100}$$
$$(26.5)\cdot 100 = r\cdot(13.7)$$
$$2650 = 13.7r$$
$$13.7r = 2650$$

Divide both sides of the equation by 13.7;

$$\frac{13.7r}{13.7}=\frac{2650}{13.7}$$
$$r = 193.43$$

Round up the value of *r* to the nearest whole number.

So write the value of *r* as 193.

The percent of change is 193%.

Therefore, the percent of increase in the original value is $\boxed{193\%}$.

Answer 19PA.

The original value of the product is 15.6.

The new value of the product is 11.4.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 11.4, is less than the original value, 15.6.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here *r* is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\text{change in value} = \text{original value} - \text{new value}$$
$$= 15.6 - 11.4$$
$$= 4.2$$

Substitute 4.2 for change in value and 15.6 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{4.2}{15.6}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{4.2}{15.6}=\frac{r}{100}$$
$$(4.2)\cdot 100 = r\cdot(15.6)$$
$$420 = 15.6r$$
$$15.6r = 420$$

Divide both sides of the equation by 15.6;

$$\frac{15.6r}{15.6}=\frac{420}{15.6}$$
$$r = 26.92$$

Round up the value of r to the nearest whole number.

So write the value of r as 27.

The percent of change is 27%.

Therefore, the percent of decrease in the original value is $\boxed{27\%}$.

Answer 20PA.

The original value of the product is 132.

The new value of the product is 150.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 150, is greater than the original value, 132.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 150-132\\ &= 18\end{aligned}$$

Substitute 18 for change in value and 132 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{18}{132}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{18}{132}=\frac{r}{100}$$
$$18\cdot 100 = r\cdot 132$$
$$1800 = 132r$$
$$132r = 1800$$

Divide both sides of the equation by 132;

$$\frac{132r}{132}=\frac{1800}{132}$$
$$r = 13.64$$

Round up the value of r to the nearest whole number.

So write the value of r as 14.

The percent of change is 14%.

Therefore, the percent of increase in the original value is $\boxed{14\%}$.

Answer 21PA.

The original value of the product is 85.

The new value of the product is 90.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 90, is greater than the original value, 85.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 90-85\\ &= 5\end{aligned}$$

Substitute 18 for change in value and 132 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{5}{85}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{5}{85}=\frac{r}{100}$$
$$5\cdot 100 = r\cdot 85$$
$$500 = 85r$$
$$85r = 500$$

Divide both sides of the equation by 85;

$$\frac{85r}{85}=\frac{500}{85}$$
$$r = 5.88$$

Round up the value of r to the nearest whole number.

So write the value of r as 6.

The percent of change is 6%.

Therefore, the percent of increase in the original value is $\boxed{6\%}$.

Answer 22PA.

The original value of the product is 32.5.

The new value of the product is 30.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 30, is less than the original value, 32.5.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= 32.5 - 30\\ &= 2.5\end{aligned}$$

Substitute 2.5 for change in value and 32.5 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{2.5}{32.5}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{2.5}{32.5}=\frac{r}{100}$$
$$(2.5)\cdot 100 = r\cdot(32.5)$$
$$250 = 32.5r$$
$$32.5r = 250$$

Divide both sides of the equation by 32.5;

$$\frac{32.5r}{32.5}=\frac{250}{32.5}$$
$$r = 7.69$$

Round up the value of r to the nearest whole number.

So write the value of r as 8.

The percent of change is 8%.

Therefore, the percent of decrease in the original value is $\boxed{8\%}$.

Answer 23PA.

The original value of the product is 9.8

The new value of the product is 12.1

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 12.1, is greater than the original value, 9.8.

Hence, the percent of change is a $\boxed{\text{percent increase}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= 12.1 - 9.8\\ &= 2.3\end{aligned}$$

Substitute 2.3 for change in value and 9.8 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{2.3}{9.8}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{2.3}{9.8}=\frac{r}{100}$$
$$(2.3)\cdot 100 = r\cdot(9.8)$$
$$230 = 9.8r$$
$$9.8r = 230$$

Divide both sides of the equation by 9.8;

$$\frac{9.8r}{9.8}=\frac{230}{9.8}$$
$$r = 23.47$$

Round up the value of r to the nearest whole number.

So write the value of r as 23.

The percent of change is 23%.

Therefore, the percent of increase in the original value is $\boxed{23\%}$.

Answer 24PA.

The original value of the product is 40.

The new value of the product is 32.5.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 32.5, is less than the original value, 40.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\text{change in value} = \text{original value} - \text{new value}$$
$$= 40 - 32.5$$
$$= 7.5$$

Substitute 7.5 for change in value and 40 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{7.5}{40}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{7.5}{40}=\frac{r}{100}$$
$$(7.5)\cdot 100 = r\cdot 40$$
$$750 = 40r$$
$$40r = 750$$

Divide both sides of the equation by 40;

$$\frac{40r}{40}=\frac{750}{40}$$
$$r = 18.75$$

Round up the value of r to the nearest whole number.

So write the value of r as 19.

The percent of change is 19%.

Therefore, the percent of decrease in the original value is $\boxed{19\%}$.

Answer 25PA.

The original value of the product is 25.

The new value of the product is 21.5.

The objective is to find the percent of change.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new value of the product, 21.5, is less than the original value, 25.

Hence, the percent of change is a $\boxed{\text{percent decrease}}$.

Use the following proportion to find the percent of change;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of change.

The new value is less than the original value. Hence, find the change in value as follows;

$$\text{change in value} = \text{original value} - \text{new value}$$
$$= 25 - 21.5$$
$$= 3.5$$

Substitute 3.5 for change in value and 25 for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{3.5}{25}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{3.5}{25}=\frac{r}{100}$$
$$(3.5)\cdot 100 = r\cdot 25$$
$$350 = 25r$$
$$25r = 350$$

Divide both sides of the equation by 24;

$$\frac{25r}{25}=\frac{350}{25}$$
$$r = 14$$

The percent of change is 14%.

Therefore, the percent of decrease in the original value is $\boxed{14\%}$.

Answer 26PA.

The number of people that visited the theme parks in the year 1990 is 253 million.

The number of people that visited the theme parks in the year 2000 is 317 million.

The objective is to find the percent of increase.

Use the following proportion to find the percent of increase;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of increase.

The increase in the number of people is from 253 million to 317 million.

Hence consider the original value as 253 million and the new value as 317 million.

Find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= (317-253)\,\text{million}\\ &= 64\ \text{million}\end{aligned}$$

Substitute 64 million for change in value and 253 million for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{64\ \text{million}}{253\ \text{million}}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{64}{253}=\frac{r}{100}$$
$$64\cdot 100 = r\cdot 253$$
$$6400 = 253r$$
$$253r = 6400$$

Divide both sides of the equation by 253;

$$\frac{253r}{253}=\frac{6400}{253}$$
$$r = 25.296$$

Round up the value of r to the nearest whole number.

So write the value of r as 25.

The percent of change is 25%.

Therefore, the percent of increase in the number of visitors is about $\boxed{25\%}$.

Answer 27PA.

The number of active duty military personnel in the year 1987 is 2 million.

The number of active duty military personnel in the year 2000 is 1.4 million.

The objective is to find the percent of decrease.

Use the following proportion to find the percent of decrease;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here r is the percent of decrease.

The decrease in the number of military personnel is from 2 million to 1.4 million.

Hence consider the original value as 2 million and the new value as 1.4 million.

Find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= (2-1.4)\,\text{million}\\ &= 0.6\ \text{million}\end{aligned}$$

Substitute 0.6 million for change in value and 2 million for original value in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{0.6\ \text{million}}{2\ \text{million}}=\frac{r}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{0.6}{2}=\frac{r}{100}$$
$$0.6\cdot 100=r\cdot 2$$
$$60=2r$$
$$2r=60$$

Divide both sides of the equation by 2;

$$\frac{2r}{2}=\frac{60}{2}$$
$$r=30$$

The percent of change is 30%.

Therefore, the percent of decrease in the number of active-duty military personnel is $\boxed{30\%}$.

Answer 28PA.

The new number is 522.

The percent of increase is 16%.

The objective is to find the original number.

Suppose the original number is *x*.

The following proportion gives a formula to the percent of increase;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here *r* is the percent of increase.

The percent of increase is 16%.

Therefore, $r=16$.

Since, the change in percent is percent of increase; the new number is greater than the original number.

So find the change in value as follows;

$$\text{change in value}=\text{new value}-\text{original value}$$
$$=522-x$$

Substitute $522-x$ for change in value, *x* for original value and 16 for *r* in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$
$$\frac{522-x}{x}=\frac{16}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{522-x}{x}=\frac{16}{100}$$
$$(52-x)\cdot 100=16\cdot x$$

Use distributive property to open the parenthesis.

The distributive property for three numbers *a*, *b* and *c* is as follows;

$$(a\pm b)\cdot c=a\cdot c\pm b\cdot c$$

So, rewrite the equation as follows;

$$(522-x)\cdot 100=16\cdot x$$
$$522\cdot 100-x\cdot 100=16x$$
$$52200-100x=16x$$

Add $100x$ to both sides of the equation;

$$52200-100x=16x$$
$$52200-100x+100x=16x+100x$$
$$52200=116x$$
$$116x=52200$$

Divide both sides of the equation by 116;

$$\frac{116x}{116}=\frac{52200}{116}$$
$$x=450$$

Therefore, the original number is $\boxed{450}$.

Answer 29PA.

The amount of fat in one ounce of reduced fat chips is 6 g.

One ounce of reduced fat chips has 25% less fat than in one ounce of regular chips.

The objective is to find the amount of fat in one ounce of regular chips.

Suppose the amount of fat in one ounce of regular chips is *x* g.

Since, the amount of fat in reduced fat chips is 25% less than that in regular chips; it is a case of percent of decrease.

The following proportion gives a formula to the percent of decrease;

$$\frac{\text{change in value}}{\text{original value}}=\frac{r}{100}$$

Here *r* is the percent of decrease.

The percent of decrease is 25%.

Therefore, $r=25$.

Since, the change in percent is percent of decrease; the new number is less than the original number.

So find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{original value} - \text{new value}\\ &= x - 6\end{aligned}$$

Substitute $x-6$ for change in value, *x* for original value and 25 for *r* in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

$$\frac{x-6}{x} = \frac{25}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{x-6}{x} = \frac{25}{100}$$

$$(x-6)\cdot 100 = 25\cdot x$$

Use distributive property to open the parenthesis.

The distributive property for three numbers *a*, *b* and *c* is as follows;

$$(a \pm b)\cdot c = a\cdot c \pm b\cdot c$$

So, rewrite the equation as follows;

$$(x-6)\cdot 100 = 25\cdot x$$

$$x\cdot 100 - 6\cdot 100 = 25x$$

$$100x - 600 = 25x$$

Add 600 to both sides and subtract $25x$ from both sides of the equation;

$$100x - 600 = 25x$$

$$100x - 600 + 600 - 25x = 25x - 25x + 600$$

$$75x = 600$$

Divide both sides of the equation by 75;

$$\frac{75x}{75} = \frac{600}{75}$$

$$x = 8$$

Therefore, the amount of fat in one ounce of regular chips is $\boxed{8\text{ g}}$.

Answer 30PA.

The number of internet hosts in the year 2001 is 109.6 million.

The percent of increase in the number of internet hosts from the year 1996 to 2001 is 1054%.

The objective is to find the number of internet hosts in the year 1996.

Suppose the original number of hosts in the year 1996 is *x* millions.

The following proportion gives a formula to the percent of increase;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

Here *r* is the percent of increase.

The percent of increase is 1054%.

Therefore, $r = 1054$.

Since, the change in percent is percent of increase; the new number is greater than the original number.

That is, the new value, which is the number of internet hosts in 2001, is greater than the original value, which is the number of internet hosts in 1996.

So find the change in value as follows;

$$\begin{aligned}\text{change in value} &= \text{new value} - \text{original value}\\ &= (109.6 - x)\,\text{millions}\end{aligned}$$

Substitute $(109.6 - x)\,\text{millions}$ for change in value, *x* millions for original value and 1054 for *r* in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{change in value}}{\text{original value}} = \frac{r}{100}$$

$$\frac{(109.6 - x)\,\text{millions}}{x\ \text{millions}} = \frac{1054}{100}$$

Cross multiply the terms and form the following equation;

$$\frac{109.6 - x}{x} = \frac{1054}{100}$$

$$(109.6 - x)\cdot 100 = 1054 \cdot x$$

Use distributive property to open the parenthesis.

The distributive property for three numbers *a*, *b* and *c* is as follows;

$$(a \pm b)\cdot c = a\cdot c \pm b\cdot c$$

So, rewrite the equation as follows;

$$(109.6 - x)\cdot 100 = 1054 \cdot x$$

$$(109.6)\cdot 100 - x\cdot 100 = 1054x$$

$$10960 - 100x = 1054x$$

Add $100x$ to both sides of the equation;

$$\begin{aligned} 10960-100x &= 1054x \\ 10960-100x+100x &= 1054x+100x \\ 10960 &= 1154x \\ 1154x &= 10960 \end{aligned}$$

Divide both sides of the equation by 1154;

$$\begin{aligned} \frac{1154x}{1154} &= \frac{10960}{1154} \\ x &= 9.497 \end{aligned}$$

Round up the value of *x* to one decimal.

So, the value of *x* is 9.5 million.

Therefore, the number of internet hosts in the year 1996 is about $\boxed{9.5 \text{ million}}$.

Answer 31PA.

The price of the umbrella is $14.00

The sales tax on the umbrella price is 5.5%.

The objective is to find the total price of the umbrella.

The total price of the umbrella is original price with the tax added to it.

So find the tax to be added.

The tax is 5.5% of the original price of the umbrella.

So calculate 5.5% of $14.00.

Do the following calculation for tax;

$$\begin{aligned} 5.5\% \text{ of } 14.00 &= \frac{5.5}{100}\times 14.00 \\ &= 0.77 \end{aligned}$$

Thus, the sales tax on the original price of the umbrella is $0.77

Add the sales tax to the original price of the umbrella.

$$\begin{aligned} \text{Total price} &= \text{original price} + \text{sales tax} \\ &= 14.00 + 0.77 \\ &= 14.77 \end{aligned}$$

Therefore, the total price of the umbrella is $\boxed{\$14.77}$.

Answer 32PA.

The price of the backpack is $35.00

The sales tax on the backpack price is 7%.

The objective is to find the total price of the backpack.

The total price of the backpack is original price with the tax added to it.

So find the tax to be added.

The tax is 7% of the original price of the backpack.

So calculate 7% of $35.00.

Do the following calculation for tax;

$$\begin{aligned}7\%\text{ of }35.00 &= \frac{7}{100}\times 35.00\\ &= 2.45\end{aligned}$$

Thus, the sales tax on the original price of the backpack is $2.45

Add the sales tax to the original price of the backpack.

$$\begin{aligned}\text{Total price} &= \text{original price} + \text{sales tax}\\ &= 35.00 + 2.45\\ &= 37.45\end{aligned}$$

Therefore, the total price of the backpack is $\boxed{\$37.45}$.

Answer 33PA.

The price of the candle is $7.50

The sales tax on the candle price is 5.75%.

The objective is to find the total price of the candle.

The total price of the candle is original price with the tax added to it.

So find the tax to be added.

The tax is 5.75% of the original price of the candle.

So calculate 5.75% of $7.50.

Do the following calculation for tax;

$$\begin{aligned}5.75\%\text{ of }7.50 &= \frac{5.75}{100}\times 7.50\\ &= 0.43125\end{aligned}$$

Round up the number to two decimal places.

Thus, the sales tax on the original price of the candle is $0.43

Add the sales tax to the original price of the candle.

$$\begin{aligned}\text{Total price} &= \text{original price} + \text{sales tax}\\ &= 7.50 + 0.43\\ &= 7.93\end{aligned}$$

Therefore, the total price of the candle is $\boxed{\$7.93}$.

Answer 34PA.

The price of the hat is $18.50

The sales tax on the hat price is 6.25%.

The objective is to find the total price of the hat.

The total price of the hat is original price with the tax added to it.

So find the tax to be added.

The tax is 6.25% of the original price of the hat.

So calculate 6.25% of $18.50.

Do the following calculation for tax;

$$\begin{aligned}6.25\%\text{ of }18.50 &= \frac{6.25}{100}\times 18.50\\ &= 1.15625\end{aligned}$$

Round up the number to two decimal places.

Thus, the sales tax on the original price of the hat is $1.16

Add the sales tax to the original price of the hat.

$$\begin{aligned}\text{Total price} &= \text{original price} + \text{sales tax}\\ &= 18.50 + 1.16\\ &= 19.66\end{aligned}$$

Therefore, the total price of the hat is $\boxed{\$19.66}$.

Answer 35PA.

The price of the clock radio is $39.99

The sales tax on the clock radio price is 6.75%.

The objective is to find the total price of the clock radio.

The total price of the clock radio is original price with the tax added to it.

So find the tax to be added.

The tax is 6.75% of the original price of the clock radio.

So calculate 6.75% of $39.99.

Do the following calculation for tax;

$$\begin{aligned}6.75\%\text{ of }39.99 &= \frac{6.75}{100}\times 39.99\\ &= 2.699325\end{aligned}$$

Round up the number to two decimal places.

Thus, the sales tax on the original price of the clock radio is $2.70

Add the sales tax to the original price of the clock radio.

$$\begin{aligned}\text{Total price} &= \text{original price} + \text{sales tax}\\ &= 39.99 + 2.70\\ &= 42.69\end{aligned}$$

Therefore, the total price of the clock radio is $\boxed{\$42.69}$.

Answer 36PA.

The price of the sandals is $29.99

The sales tax on the sandals price is 5.75%.

The objective is to find the total price of the sandals.

The total price of the sandals is original price with the tax added to it.

So find the tax to be added.

The tax is 5.75% of the original price of the sandals.

So calculate 5.75% of $29.99.

Do the following calculation for tax;

$$\begin{aligned}5.75\%\text{ of }29.99 &= \frac{5.75}{100}\times 29.99\\ &= 1.724425\end{aligned}$$

Round up the number to two decimal places.

Thus, the sales tax on the original price of the sandals is $1.72

Add the sales tax to the original price of the sandals.

$$\begin{aligned}\text{Total price} &= \text{original price} + \text{sales tax}\\ &= 29.99 + 1.72\\ &= 31.71\end{aligned}$$

Therefore, the total price of the sandals is $\boxed{\$31.71}$.

Answer 37PA.

The price of the shirt is $45.00

The discount on the original price is 40%.

The objective is to find the price of the shirt after discount.

The price of the shirt after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 40% of the original price of the shirt.

So calculate 40% of $45.00

Do the following calculation for discount;

$$\begin{aligned}40\%\text{ of }45 &= \frac{40}{100}\times 45\\ &= 18\end{aligned}$$

Thus, the discount on the original price of the shirt is $18.00

Answer 38PA.

The price of the socks is $6.00

The discount on the original price is 20%.

The objective is to find the price of the socks after discount.

The price of the socks after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 20% of the original price of the socks.

So calculate 20% of $6.00

Do the following calculation for discount;

$$\begin{aligned}20\%\text{ of }6.00 &= \frac{20}{100}\times 6.00\\ &= 1.20\end{aligned}$$

Thus, the discount on the original price of the socks is $1.20

Subtract the discount price from the original price of the socks.

$$\begin{aligned}\text{New price} &= \text{original price} - \text{discount}\\ &= 6.00 - 1.20\\ &= 4.80\end{aligned}$$

Therefore, the price of the socks after discount is $\boxed{\$4.80}$.

Answer 40PA.

The price of the gloves is $24.25

The discount on the original price is 33%.

The objective is to find the price of the gloves after discount.

The price of the gloves after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 33% of the original price of the gloves.

So calculate 33% of $24.25

Do the following calculation for discount;

$$\begin{aligned}33\%\text{ of }24.25 &= \frac{33}{100}\times 24.25\\ &= 8.0025\end{aligned}$$

Round up the number to two decimal places.

Thus, the discount on the original price of the gloves is $8.00

Subtract the discount price from the original price of the gloves.

$$\begin{aligned}\text{New price} &= \text{original price} - \text{discount}\\ &= 24.25 - 8.00\\ &= 16.25\end{aligned}$$

Therefore, the price of the gloves after discount is $\boxed{\$16.25}$.

Answer 41PA.

The price of the suit is $175.95

The discount on the original price is 45%.

The objective is to find the price of the suit after discount.

The price of the suit after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 45% of the original price of the suit.

So calculate 45% of $175.95

Do the following calculation for discount;

$$\begin{aligned}45\%\text{ of }175.95 &= \frac{45}{100}\times 175.95\\ &= 79.1775\end{aligned}$$

Round up the number to two decimal places.

Thus, the discount on the original price of the suit is $79.18

Subtract the discount price from the original price of the suit.

$$\begin{aligned}\text{New price} &= \text{original price} - \text{discount}\\ &= 175.95 - 79.18\\ &= 96.77\end{aligned}$$

Therefore, the price of the suit after discount is $\boxed{\$96.77}$.

Answer 42PA.

The price of the coat is $79.99

The discount on the original price is 30%.

The objective is to find the price of the coat after discount.

The price of the coat after discount is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 30% of the original price of the coat.

So calculate 30% of $79.99

Do the following calculation for discount;

$$\begin{aligned}30\%\text{ of }79.99 &= \frac{30}{100}\times 79.99\\ &= 23.997\end{aligned}$$

Round up the number to two decimal places.

Thus, the discount on the original price of the coat is $24.00

Subtract the discount price from the original price of the coat.

$$\begin{aligned}\text{New price} &= \text{original price} - \text{discount}\\ &= 79.99 - 24.00\\ &= 55.99\end{aligned}$$

Therefore, the price of the coat after discount is $\boxed{\$55.99}$.

Answer 43PA.

The price of the lamp is $120.00

The discount on the original price is 20%.

The tax is 6% which means that the tax is 6% of the discounted price.

The objective is to find the final price of the lamp.

The final price of the lamp is the discounted price with tax added.

So find the discount to be subtracted.

The discount is 20% of the original price of the lamp.

So calculate 20% of $120.00

Do the following calculation for discount;

$$\begin{aligned}20\%\text{ of }120.00 &= \frac{20}{100}\times 120.00\\ &= 24.00\end{aligned}$$

Thus, the discount on the original price of the lamp is $24.00

Subtract the discount from the original price and find the discounted price of the lamp as follows;

$$\begin{aligned}\text{Discounted price} &= \text{original price} - \text{discount}\\ &= 120.00 - 24.00\\ &= 96.00\end{aligned}$$

Hence, the discounted price of the lamp is $96.00

Find the tax to be added.

The tax is 6% of the discounted price of the lamp.

So calculate 6% of $96.00.

Do the following calculation for tax;

$$\begin{aligned}6\%\text{ of }96.00 &= \frac{6}{100}\times 96.00\\ &= 5.76\end{aligned}$$

Thus, the tax on the discounted price of the lamp is $5.76

Add the tax to the discounted price of the lamp and calculate the final price of the lamp as follows;

$$\begin{aligned}\text{Final price} &= \text{discounted price} + \text{tax}\\ &= 96.00 + 5.76\\ &= 101.76\end{aligned}$$

Therefore, the final price of the lamp is $\boxed{\$101.76}$.

Answer 44PA.

The price of the dress is $70.00

The discount on the original price is 30%.

The tax is 7% which means that the tax is 7% of the discounted price.

The objective is to find the final price of the dress.

The final price of the dress is the discounted price with tax added.

So find the discount to be subtracted.

The discount is 30% of the original price of the dress.

So calculate 30% of $70.00

Do the following calculation for discount;

$$\begin{aligned}30\%\text{ of }70.00 &= \frac{30}{100}\times 70.00\\ &= 21.00\end{aligned}$$

Thus, the discount on the original price of the dress is $21.00

Subtract the discount from the original price and find the discounted price of the dress as follows;

$$\begin{aligned}\text{Discounted price} &= \text{original price} - \text{discount}\\ &= 70.00 - 21.00\\ &= 49.00\end{aligned}$$

Hence, the discounted price of the dress is $49.00

Find the tax to be added.

The tax is 7% of the discounted price of the dress.

So calculate 7% of $49.00.

Do the following calculation for tax;

$$\begin{aligned}7\%\text{ of }49.00 &= \frac{7}{100}\times 49.00\\ &= 3.43\end{aligned}$$

Thus, the tax on the discounted price of the dress is $3.43

Add the tax to the discounted price of the dress and calculate the final price of the dress as follows;

$$\begin{aligned}\text{Final price} &= \text{discounted price} + \text{tax}\\ &= 49.00 + 3.43\\ &= 52.43\end{aligned}$$

Therefore, the final price of the dress is $\boxed{\$52.43}$.

Answer 45PA.

The price of the camera is $58.00

The discount on the original price is 25%.

The tax is 6.5% which means that the tax is 6.5% of the discounted price.

The objective is to find the final price of the camera.

The final price of the camera is the discounted price with tax added.

So find the discount to be subtracted.

The discount is 25% of the original price of the camera.

So calculate 25% of $58.00

Do the following calculation for discount;

$$\begin{aligned}25\%\text{ of }58.00 &= \frac{25}{100}\times 58.00\\ &= 14.50\end{aligned}$$

Thus, the discount on the original price of the camera is $14.50

Subtract the discount from the original price and find the discounted price of the camera as follows;

$$\begin{aligned}\text{Discounted price} &= \text{original price} - \text{discount}\\ &= 58.00 - 14.50\\ &= 43.50\end{aligned}$$

Hence, the discounted price of the camera is $43.50

Find the tax to be added.

The tax is 6.5% of the discounted price of the camera.

So calculate 6.5% of $43.50.

Do the following calculation for tax;

$$\begin{aligned}6.5\%\text{ of }43.50 &= \frac{6.5}{100}\times 43.50\\ &= 2.8275\end{aligned}$$

Round up the number to two decimal places.

Thus, the tax on the discounted price of the camera is $2.83

Add the tax to the discounted price of the camera and calculate the final price of the camera as follows;

$$\begin{aligned}\text{Final price} &= \text{discounted price} + \text{tax}\\ &= 43.50 + 2.83\\ &= 46.33\end{aligned}$$

Therefore, the final price of the camera is $\boxed{\$46.33}$.

Answer 46PA.

Write the following table showing the population in billions in the year 1997 and the projected percent of increase in the population for the year 2050 for the countries *C*, *I* and *U*;

Country	Population for the year 1997 in billions	Projected percent of increase in population for the year 2050
C	1.24	22.6%
I	0.97	57.8%
U	0.27	44.4%

The objective is to find the estimated population of the countries *C*, *I* and *U* in the year 2050.

The population of the country *C* in the year 1997 is 1.24 billion.

The country's population in the year 2050 is projected to be 22.6% of that in the year 1997.

Hence, the population of the country in 2050 is increased by 22.6% of that in the year 1997.

So calculate 22.6% of 1.24;

$$\begin{aligned}22.6\%\text{ of }1.24 &= \frac{22.6}{100}\times 1.24\\ &= 0.28024\end{aligned}$$

Round up the number to two decimal places.

Thus, the increase in population is by 0.28 billion.

Add the increase in population to the population in the year 1997 and find the population in the year 2050 as follows;

$$\begin{aligned}\text{Population in 2050} &= \text{population in 1997} + \text{increase in population}\\ &= (1.24 + 0.28)\text{ billion}\\ &= 1.52\text{ billion}\end{aligned}$$

Therefore, the projected population of the country *C* in the year 2050 is $\boxed{1.52\text{ billion}}$.

The population of the country *I* in the year 1997 is 0.97 billion.

The country's population in the year 2050 is projected to be 57.8% of that in the year 1997.

Hence, the population of the country in 2050 is increased by 57.8% of that in the year 1997.

So calculate 57.8% of 0.97;

$$\begin{aligned}57.8\%\text{ of }0.97 &= \frac{57.8}{100}\times 0.97\\ &= 0.56066\end{aligned}$$

Round up the number to two decimal places.

Thus, the increase in population is by 0.56 billion.

Add the increase in population to the population in the year 1997 and find the population in the year 2050 as follows;

$$\begin{aligned}\text{Population in 2050} &= \text{population in 1997} + \text{increase in population}\\ &= (0.97 + 0.56)\text{billion}\\ &= 1.53\text{ billion}\end{aligned}$$

Therefore, the projected population of the country *I* in the year 2050 is $\boxed{1.53\text{ billion}}$.

The population of the country *U* in the year 1997 is 0.27 billion.

The countries population in the year 2050 is projected to be 44.4% of that in the year 1997.

Hence, the population of the country in 2050 is increased by 44.4% of that in the year 1997.

So calculate 44.4% of 0.27;

$$\begin{aligned}44.4\%\text{ of }0.27 &= \frac{44.4}{100}\times 0.27\\ &= 0.11988\end{aligned}$$

Round up the number to two decimal places.

Thus, the increase in population is by 0.12 billion.

Add the increase in population to the population in the year 1997 and find the population in the year 2050 as follows;

$$\begin{aligned}\text{Population in 2050} &= \text{population in 1997} + \text{increase in population}\\ &= (0.27 + 0.12)\text{billion}\\ &= 0.39\text{ billion}\end{aligned}$$

Therefore, the projected population of the country *U* in the year 2050 is $\boxed{0.39\text{ billion}}$.

Answer 47PA.

Write the following table showing the population in billions in the year 1997 and the projected percent of increase in the population for the year 2050 for the countries *C*, *I* and *U*;

Country	Population for the year 1997 in billions	Projected percent of increase in population for the year 2050
C	1.24	22.6%
I	0.97	57.8%
U	0.27	44.4%

The objective is to find the most populous country of the countries *C*, *I* and *U* in the year 2050.

So, find the population of each country in the year 2050.

The population of the country *C* in the year 1997 is 1.24 billion.

The country's population in the year 2050 is projected to be 22.6% of that in the year 1997.

Hence, the population of the country in 2050 is increased by 22.6% of that in the year 1997.

So calculate 22.6% of 1.24;

$$\begin{aligned}22.6\%\text{ of }1.24 &= \frac{22.6}{100}\times 1.24\\ &= 0.28024\end{aligned}$$

Round up the number to two decimal places.

Thus, the increase in population is by 0.28 billion.

Add the increase in population to the population in the year 1997 and find the population in the year 2050 as follows;

$$\begin{aligned}\text{Population in 2050} &= \text{population in 1997} + \text{increase in population}\\ &= (1.24 + 0.28)\text{ billion}\\ &= 1.52\text{ billion}\end{aligned}$$

Therefore, the projected population of the country *C* in the year 2050 is 1.52 billion.

The population of the country *I* in the year 1997 is 0.97 billion.

The country's population in the year 2050 is projected to be 57.8% of that in the year 1997.

Hence, the population of the country in 2050 is increased by 57.8% of that in the year 1997.

So calculate 57.8% of 0.97;

$$\begin{aligned}57.8\%\text{ of }0.97 &= \frac{57.8}{100}\times 0.97\\ &= 0.56066\end{aligned}$$

Round up the number to two decimal places.

Thus, the increase in population is by 0.56 billion.

Add the increase in population to the population in the year 1997 and find the population in the year 2050 as follows;

$$\begin{aligned}\text{Population in 2050} &= \text{population in 1997} + \text{increase in population}\\ &= (0.97 + 0.56)\text{ billion}\\ &= 1.53\text{ billion}\end{aligned}$$

Hence, the projected population of the country *I* in the year 2050 is 1.53 billion.

The population of the country *U* in the year 1997 is 0.27 billion.

The countries population in the year 2050 is projected to be 44.4% of that in the year 1997.

Hence, the population of the country in 2050 is increased by 44.4% of that in the year 1997.

So calculate 44.4% of 0.27;

$$\begin{aligned}44.4\%\text{ of }0.27 &= \frac{44.4}{100}\times 0.27\\ &= 0.11988\end{aligned}$$

Round up the number to two decimal places.

Thus, the increase in population is by 0.12 billion.

Add the increase in population to the population in the year 1997 and find the population in the year 2050 as follows;

$$\begin{aligned}\text{Population in 2050} &= \text{population in 1997} + \text{increase in population}\\ &= (0.27+0.12)\text{billion}\\ &= 0.39\text{ billion}\end{aligned}$$

Hence, the projected population of the country *U* in the year 2050 is 0.39 billion.

Out of the numbers 1.52 billion, 1.53 billion and 0.39 billion, the number 1.53 billion is the largest which corresponds to country *I*.

Hence, out of the countries *C*, *I* and *U*, the country *I* has the highest population of 1.53 billion.

Therefore, the most populous country in the year 2050 is $\boxed{\text{country } I}$.

Answer 49PA.

Write the following expression;

$$x\%\text{ of }y\text{ and }y\%\text{ of }x$$

The object is to comment on the equality of the two expressions.

Find $x\%\text{ of }y$ as follows;

$$\begin{aligned}x\%\text{ of }y &= \frac{x}{100}\cdot y\\ &= \frac{xy}{100}\end{aligned}$$

Similarly find the expression for $y\%\text{ of }x$ as follows;

$$\begin{aligned}y\%\text{ of }x &= \frac{y}{100}\cdot x\\ &= \frac{yx}{100}\end{aligned}$$

Use the commutative property for multiplication of real numbers here.

The commutative property for multiplication of real numbers states that for any two real numbers *a* and *b*;

$$ab = ba$$

Use the commutative property in the expression for $y\%\text{ of }x$ and rewrite the expression as follows;

$$\begin{aligned} y\%\text{ of }x &= \frac{y}{100}\cdot x \\ &= \frac{yx}{100} \\ &= \frac{xy}{100} \\ &= x\%\text{ of }y \end{aligned}$$

Therefore, the expressions $x\%\text{ of }y$ and $y\%\text{ of }x$ are $\boxed{\text{always}}$ equal.

Answer 51PA.

The number of students at the school increased from 840 to 910.

Hence, the original number of students is 840.

The new number of students is 910.

The objective is to find the proportion representing the change in percent.

If the new value is greater than the old value then this means that there is an increase in the old value of the quantity. Hence the change in percent is called as the percent of increase.

If the new value is less than the old value then this means that there is a decrease in the original value. Hence the change in percent is called the percent of decrease.

Observe that the new number, 910, is greater than the original number, 840.

Hence, the percent of change is percent of increase.

Use the following proportion to find the percent of change;

$$\frac{\text{amount of change}}{\text{original number}} = \frac{r}{100}$$

Here r is the percent of change.

The new value is greater than the original value. Hence, find the amount of change as follows;

$$\begin{aligned}\text{amount of change} &= \text{new number} - \text{original number}\\ &= 910 - 840\\ &= 70\end{aligned}$$

Substitute 70 for amount of change and 840 for original number in the proportion mentioned above and rewrite the proportion as follows;

$$\frac{\text{amount of change}}{\text{original number}} = \frac{r}{100}$$

$$\frac{70}{840} = \frac{r}{100}$$

Thus, the proportion that represents the percent of change is;

$$\frac{70}{840} = \frac{r}{100}$$

This proportion is shown in option B.

Therefore the correct answer is $\boxed{\text{option B}}$.

Answer 52PA.

The price of the television is $249.00

The television is on sale.

The discount on the original price is 30%.

The objective is to find the sale price of the television that is its price after discount.

The sale price of the television is the original price minus the discount price.

So find the discount to be subtracted.

The discount is 30% of the original price of the television.

So calculate 30% of $249.00

Do the following calculation for discount;

$$\begin{aligned}30\%\text{ of }249.00 &= \frac{30}{100}\times 249.00\\ &= 74.70\end{aligned}$$

Thus, the discount on the original price of the television is $74.70

Subtract the discount price from the original price of the television.

$$\begin{aligned}\text{New price} &= \text{original price} - \text{discount}\\ &= 249.00 - 74.70\\ &= 174.30\end{aligned}$$

So, the price of the television after discount that is its sale price is $\$174.30$.

Option C specifies this number.

Therefore, the correct answer is $\boxed{\text{option C}}$.

Answer 53MYS.

Write the following proportion;

$$\frac{a}{45} = \frac{3}{15}$$

Cross multiply the terms;

$$\begin{aligned}\frac{a}{45} &= \frac{3}{15}\\ a \cdot 15 &= 3 \cdot 45\end{aligned}$$

Carry out the multiplication and write the equation in terms of *a* as follows;

$$\begin{aligned}a \cdot 15 &= 3 \cdot 45\\ 15a &= 135\end{aligned}$$

Divide both sides of the equations by 15;

$$\begin{aligned}\frac{15a}{15} &= \frac{135}{15}\\ a &= 9\end{aligned}$$

Therefore, the value of the variable in the proportion is $\boxed{a = 9}$.

Answer 54MYS.

Write the following proportion;

$$\frac{2}{3} = \frac{8}{d}$$

Cross multiply the terms;

$$\begin{aligned}\frac{2}{3} &= \frac{8}{d}\\ 2 \cdot d &= 8 \cdot 3\end{aligned}$$

Carry out the multiplication and write the equation in terms of *d* as follows;

$$\begin{aligned}2 \cdot d &= 8 \cdot 3\\ 2d &= 24\end{aligned}$$

Divide both sides of the equations by 2;

$$\begin{aligned}\frac{2d}{2} &= \frac{24}{2}\\ d &= 12\end{aligned}$$

Therefore the value of the variable in the proportion is $\boxed{d = 12}$.

Answer 55MYS.

Write the following proportion;

$$\frac{5.22}{13.92}=\frac{t}{48}$$

Cross multiply the terms;

$$\frac{5.22}{13.92}=\frac{t}{48}$$
$$(5.22)\cdot 48 = t\cdot(13.92)$$

Carry out the multiplication and write the equation in terms of t as follows;

$$(5.22)\cdot 48 = t\cdot(13.92)$$
$$250.56 = 13.92t$$
$$13.92t = 250.56$$

Divide both sides of the equations by 13.92;

$$\frac{13.92t}{13.92}=\frac{250.56}{13.92}$$
$$t = 18$$

Therefore the value of the variable in the proportion is $\boxed{t=18}$.

Answer 53MYS.

Write the following equation;

$$6n+3=-3$$

The objective is to solve the equation and find the value of n.

Subtract 3 from both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$6n+3=-3$$
$$6n+3-3=-3-3$$
$$6n=-6$$

Divide both sides of the equation by 6 and rewrite the equation as follows;

Simplify the equation

$$\frac{6n}{6}=\frac{-6}{6}$$
$$n=-1$$

Therefore, the equation $6n+3=-3$ has the solution $\boxed{n=-1}$.

Check the solution.

So, substitute -1 for *n* on the left hand side of the equation $6n+3=-3$;

$$\begin{aligned}6n+3&=6(-1)+3\\&=-6+3\\&=-3\end{aligned}$$

The right hand side of the equation $6n+3=-3$ is -3.

Thus, the right and the left hand sides of the equation give the same value for $n=-1$.

Hence, the result is verified.

Answer 57MYS.

Write the following equation;

$$7+5c=-23$$

The objective is to solve the equation and find the value of *c*.

Subtract 7 from both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}7+5c&=-23\\7+5c-7&=-23-7\\5c&=-30\end{aligned}$$

Divide both sides of the equation by 5 and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}\frac{5c}{5}&=\frac{-30}{5}\\c&=-6\end{aligned}$$

Therefore, the equation $7+5c=-23$ has the solution $\boxed{c=-6}$.

Check the solution.

So, substitute -6 for *c* on the left hand side of the equation $7+5c=-23$;

$$\begin{aligned}7+5c&=7+5(-6)\\&=7-30\\&=-23\end{aligned}$$

The right hand side of the equation $7+5c=-23$ is -23.

Thus, the right and the left hand sides of the equation give the same value for $c=-6$.

Hence, the result is verified.

Answer 58MYS.

Write the following equation;

$$18 = 4a - 2$$

The objective is to solve the equation and find the value of *a*.

Add 2 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned} 18 &= 4a - 2 \\ 18 + 2 &= 4a - 2 + 2 \\ 20 &= 4a \end{aligned}$$

Divide both sides of the equation by 4 and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned} \frac{20}{4} &= \frac{4a}{4} \\ 5 &= a \\ a &= 5 \end{aligned}$$

Therefore, the equation $18 = 4a - 2$ has the solution $\boxed{a = 5}$.

Check the solution.

So, substitute 5 for *a* on the right hand side of the equation $18 = 4a - 2$;

$$\begin{aligned} 4a - 2 &= 4(5) - 2 \\ &= 20 - 2 \\ &= 18 \end{aligned}$$

The left hand side of the equation $18 = 4a - 2$ is 18.

Thus, the right and the left hand sides of the equation give the same value for $a = 5$.

Hence, the result is verified.

Answer 59MYS.

Write the following expression;

$$\frac{2}{5}\div 4$$

The objective is to find the quotient.

Express the division as multiplication by taking the reciprocal of the divisor.

The divisor in the above expression is 4.

The reciprocal of the divisor is $\frac{1}{4}$.

So, rewrite the division expression as follows;

Cancel the common factors

$$\begin{aligned}\frac{2}{5}\div 4 &= \frac{2}{5}\times\frac{1}{4}\\ &= \frac{1}{10}\end{aligned}$$

Therefore, the quotient is $\boxed{\frac{1}{10}}$.

Answer 60MYS.

Write the following expression;

$$-\frac{4}{5}\div\frac{2}{3}$$

The objective is to find the quotient.

Express the division as multiplication by taking the reciprocal of the divisor.

The divisor in the above expression is $\frac{2}{3}$.

The reciprocal of the divisor is $\frac{1}{\frac{2}{3}}=\frac{3}{2}$.

So, rewrite the division expression as follows;

Cancel the common factors

$$\begin{aligned}-\frac{4}{5}\div\frac{2}{3} &= -\frac{4}{5}\times\frac{3}{2}\\ &= -\frac{6}{5}\end{aligned}$$

Therefore, the quotient is $\boxed{-\frac{6}{5}}$.

Answer 61MYS.

Write the following expression;

$$-\frac{1}{9}\div\left(-\frac{3}{4}\right)$$

The objective is to find the quotient.

Express the division as multiplication by taking the reciprocal of the divisor.

The divisor in the above expression is $-\frac{3}{4}$.

The reciprocal of the divisor is $\frac{1}{-\frac{3}{4}}=-\frac{4}{3}$.

So, rewrite the division expression as follows;

Multiply

Product of two negative numbers is positive

$$\begin{aligned}-\frac{1}{9}\div\left(-\frac{3}{4}\right)&=-\frac{1}{9}\times\left(-\frac{4}{3}\right)\\&=\frac{4}{27}\end{aligned}$$

Therefore, the quotient is $\boxed{\frac{4}{27}}$.

Answer 62MYS.

Write the following equation;

$$a^2+5=17-a$$

The objective is to find the truth value of the equation for $a=3$.

So, substitute 3 for *a* on the left hand side of the equation $a^2+5=17-a$;

Simplify the expression

$$\begin{aligned}a^2+5&=(3)^2+5\\&=9+5\\&=14\end{aligned}$$

Substitute 3 for *a* on the right hand side of the equation $a^2+5=17-a$;

Simplify the expression

$$\begin{aligned}17-a&=17-3\\&=14\end{aligned}$$

The right and the left hand sides of the equation give the same value for $a=3$.

Therefore, the equation $a^2+5=17-a$ is $\boxed{\text{true}}$ for $a=3$.

Answer 63MYS.

Write the following equation;

$$2v^2+v=65$$

The objective is to find the truth value of the equation for $v=5$.

So, substitute 5 for *a* on the left hand side of the equation $2v^2+v=65$;

Simplify the expression

$$\begin{aligned}2v^2+v&=2(5)^2+5\\&=2(25)+5\\&=50+5\\&=55\end{aligned}$$

The right hand side of the equation $2v^2+v=65$ is 65.

The right and the left hand sides of the equation give different values for $v=5$.

Therefore, the equation $2v^2+v=65$ is $\boxed{\text{false}}$ for $v=5$.

Answer 64MYS.

Write the following equation;

$$8y-y^2=y+10$$

The objective is to find the truth value of the equation for $y=4$.

So, substitute 4 for *y* on the left hand side of the equation $8y-y^2=y+10$;

Simplify the expression

$$\begin{aligned}8y-y^2&=8(4)-(4)^2\\&=32-16\\&=16\end{aligned}$$

Substitute 4 for y on the right hand side of the equation $8y-y^2=y+10$;

Simplify the expression

$$\begin{aligned} y+10&=4+10\\ &=14 \end{aligned}$$

The right and the left hand sides of the equation give different values for $y=4$.

Therefore, the equation $8y-y^2=y+10$ is $\boxed{\text{false}}$ for $y=4$.

Answer 65MYS.

Write the following equation;

$$16p-p=15p$$

The objective is to find the truth value of the equation for $p=2.5$.

So, substitute 2.5 for p on the left hand side of the equation $16p-p=15p$;

Simplify the expression

$$\begin{aligned} 16p-p&=16(2.5)-2.5\\ &=40-2.5\\ &=37.5 \end{aligned}$$

Substitute 2.5 for p on the right hand side of the equation $16p-p=15p$;

Simplify the expression

$$\begin{aligned} 15p&=15(2.5)\\ &=37.5 \end{aligned}$$

The right and the left hand sides of the equation give same values for $p=2.5$.

Therefore, the equation $16p-p=15p$ is $\boxed{\text{true}}$ for $p=2.5$.

Answer 66MYS.

Write the following equation;

$$-43-3t=2-6t$$

The objective is to solve the equation and find the value of *t*.

Add $6t$ to both sides of the equation and rewrite the equation as follows;

Combine the like terms

$$\begin{aligned}-43-3t&=2-6t\\-43-3t+6t&=2-6t+6t\\-43+3t&=2\end{aligned}$$

Add 43 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}-43+3t&=2\\-43+3t+43&=2+43\\3t&=45\end{aligned}$$

Divide both sides of the equation by 3 and rewrite the equation as follows;

$$\begin{aligned}\frac{3t}{3}&=\frac{45}{3}\\t&=15\end{aligned}$$

Therefore, the equation $-43-3t=2-6t$ has the solution $\boxed{t=15}$.

Check the solution.

So, substitute 15 for *t* on the left hand side of the equation $-43-3t=2-6t$;

Simplify the expression

$$\begin{aligned}-43-3t&=-43-3(15)\\&=-43-45\\&=-88\end{aligned}$$

Substitute 15 for *t* on the right hand side of the equation $-43-3t=2-6t$;

Simplify the expression

$$\begin{aligned}2-6t&=2-6(15)\\&=2-90\\&=-88\end{aligned}$$

Thus, the right and the left hand sides of the equation give the same value for $t=15$.

Hence, the result is verified.

Answer 67MYS.

Write the following equation;

$$7y+7=3y-5$$

The objective is to solve the equation and find the value of *y*.

Subtract $3y$ from both sides of the equation and rewrite the equation as follows;

Combine the like terms

$$\begin{aligned}7y+7&=3y-5\\7y+7-3y&=3y-5-3y\\7y-3y+7&=3y-3y-5\\4y+7&=-5\end{aligned}$$

Subtract 7 from both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}4y+7&=-5\\4y+7-7&=-5-7\\4y&=-12\end{aligned}$$

Divide both sides of the equation by 4 and rewrite the equation as follows;

$$\begin{aligned}\frac{4y}{4}&=\frac{-12}{4}\\y&=-3\end{aligned}$$

Therefore, the equation $7y+7=3y-5$ has the solution $\boxed{y=-3}$.

Check the solution.

So, substitute -3 for *x* on the left hand side of the equation $7y+7=3y-5$;

Simplify the expression

$$\begin{aligned}7y+7&=7(-3)+7\\&=-21+7\\&=-14\end{aligned}$$

Substitute -3 for *x* on the right hand side of the equation $7y+7=3y-5$;

Simplify the expression

$$\begin{aligned}3y-5&=3(-3)-5\\&=-9-5\\&=-14\end{aligned}$$

Thus, the right and the left hand sides of the equation give the same value for $y=-3$.

Hence, the result is verified.

Answer 68MYS.

Write the following equation;

$$7(d-3)-2=5$$

The objective is to solve the equation and find the value of *d*.

Use distributive property to open the parenthesis.

The distributive property for three numbers *a*, *b* and *c* is as follows;

$$(a\pm b)\cdot c=a\cdot c\pm b\cdot c$$

So, rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}7(d-3)-2&=5\\7\cdot d-7\cdot 3-2&=5\\7d-21-2&=5\\7d-23&=5\end{aligned}$$

Add 23 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}7d-23&=5\\7d-23+23&=5+23\\7d&=28\end{aligned}$$

Divide both sides of the equation by 7 and rewrite the equation as follows;

$$\begin{aligned}\frac{7d}{7}&=\frac{28}{7}\\d&=4\end{aligned}$$

Therefore, the equation $7(d-3)-2=5$ has the solution $\boxed{d=4}$.

Check the solution.

So, substitute 4 for *d* on the left hand side of the equation $7(d-3)-2=5$;

Simplify the expression

$$\begin{aligned}7(d-3)-2&=7(4-3)-2\\&=7(1)-2\\&=7-2\\&=5\end{aligned}$$

The right hand side of the equation $7(d-3)-2=5$ is 5.

Thus, the right and the left hand sides of the equation give the same value for $d=4$.

Hence, the result is verified.

Answer 69MYS.

Write the following equation;

$$6(p+3)=4(p-1)$$

The objective is to solve the equation and find the value of p.

Use distributive property to open the parenthesis.

The distributive property for three numbers a, b and c is as follows;

$$(a\pm b)\cdot c=a\cdot c\pm b\cdot c$$

So, rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}6(p+3)&=4(p-1)\\6\cdot p+6\cdot 3&=4\cdot p-4\cdot 1\\6p+18&=4p-4\end{aligned}$$

Subtract $4p$ from both sides of the equation and rewrite the equation as follows;

Combine the like terms

$$\begin{aligned}6p+18&=4p-4\\6p+18-4p&=4p-4-4p\\6p-4p+18&=4p-4p-4\\2p+18&=-4\end{aligned}$$

Subtract 18 from both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}2p+18&=-4\\2p+18-18&=-4-18\\2p&=-22\end{aligned}$$

Divide both sides of the equation by 2 and rewrite the equation as follows;

$$\begin{aligned}\frac{2p}{2}&=\frac{-22}{2}\\p&=-11\end{aligned}$$

Therefore, the equation $6(p+3)=4(p-1)$ has the solution $\boxed{p=-11}$.

Check the solution.

So, substitute -11 for p on the left hand side of the equation $6(p+3)=4(p-1)$;

Simplify the expression

$$\begin{aligned}6(p+3)&=6(-11+3)\\&=6(-8)\\&=-48\end{aligned}$$

Substitute -11 for p on the right hand side of the equation $6(p+3)=4(p-1)$;

Simplify the expression

$$\begin{aligned}4(p-1)&=4(-11-1)\\&=4(-12)\\&=-48\end{aligned}$$

Thus, the right and the left hand sides of the equation give the same value for $p=-11$.

Hence, the result is verified.

Answer 70MYS.

Write the following equation;

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

The objective is to solve the equation and find the value of a.

Use distributive property to open the parenthesis.

The distributive property for three numbers a, b and c is as follows;

$$(a\pm b)\cdot c=a\cdot c\pm b\cdot c$$

So, rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}-5&=4-2(a-5)\\-5&=4-2\cdot a-2\cdot(-5)\\-5&=4-2a+10\\-5&=14-2a\end{aligned}$$

Subtract 14 from both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned} -5 &= 14 - 2a \\ -5 - 14 &= 14 - 2a - 14 \\ -19 &= -2a \end{aligned}$$

Divide both sides of the equation by -2 and rewrite the equation as follows;

$$\begin{aligned} \frac{-19}{-2} &= \frac{-2a}{-2} \\ \frac{19}{2} &= a \\ a &= \frac{19}{2} \end{aligned}$$

Therefore, the equation $-5 = 4 - 2(a-5)$ has the solution $\boxed{a = \frac{19}{2}}$.

Check the solution.

So, substitute $\frac{19}{2}$ for *a* on the right hand side of the equation $-5 = 4 - 2(a-5)$;

Simplify the expression

$$\begin{aligned} 4 - 2(a-5) &= 4 - 2\left(\frac{19}{2} - 5\right) \\ &= 4 - 2\left(\frac{9}{2}\right) \\ &= 4 - 9 \\ &= -5 \end{aligned}$$

The left hand side of the equation $-5 = 4 - 2(a-5)$ is -5.

Thus, the right and the left hand sides of the equation give the same value for $a = \frac{19}{2}$.

Hence, the result is verified.

Answer 71MYS.

Write the following equation;

$$8x-4=-10x+50$$

The objective is to solve the equation and find the value of *x*.

Add $10x$ to both sides of the equation and rewrite the equation as follows;

Combine the like terms

$$\begin{aligned}8x-4&=-10x+50\\8x-4+10x&=-10x+50+10x\\8x+10x-4&=-10x+10x+50\\18x-4&=50\end{aligned}$$

Add 4 to both sides of the equation and rewrite the equation as follows;

Simplify the equation

$$\begin{aligned}18x-4&=50\\18x-4+4&=50+4\\18x&=54\end{aligned}$$

Divide both sides of the equation by 18 and rewrite the equation as follows;

$$\begin{aligned}\frac{18x}{18}&=\frac{54}{18}\\x&=3\end{aligned}$$

Therefore, the equation $8x-4=-10x+50$ has the solution $\boxed{x=3}$.

Check the solution.

So, substitute 3 for *x* on the left hand side of the equation $8x-4=-10x+50$;

Simplify the expression

$$\begin{aligned}8x-4&=8(3)-4\\&=24-4\\&=20\end{aligned}$$

Substitute 3 for *x* on the right hand side of the equation $8x-4=-10x+50$;

Simplify the expression

$$\begin{aligned}-10x+50&=-10(3)+50\\&=-30+50\\&=20\end{aligned}$$

Thus, the right and the left hand sides of the equation give the same value for $x=3$.

Hence, the result is verified.