ALGEBRA

Lesson 7 Algebraic Expressions & Functions

In this lesson, you will be given a situation or formula in words, and asked to write an algebraic expression or function that represents the situation. In most of the problems, the answer will be an expression or function, not a numerical answer.

First, Some Algebra Reminders:

1. In algebra, an unknown number, called the variable, is represented by a letter, usually *x* or *y*, but any letter can be used.

2. In algebra, multiplication is shown by:

   A number next to a variable.
   5x means 5 times x

   Two variables next to each other.
   xy means x times y

   A number or variable next to parentheses.
   5(x + 7) means 5 times the quantity of (x + 7)

3. To multiply 5(*x* + 7) means to multiply 5 times each item inside the parentheses.
   5(*x* + 7) = 5*x* + 35

4. 5 times *x* is the same as *x* times 5, and both are expressed as 5*x*. The number always comes before the variable. To express it as *x*5 is incorrect form and is never used.

5. A variable with no number in front of it means 1 times the variable.
   x means 1 times *x*. If you have *x* + *x*, you can add to get 2*x*.

6. An exponent of ^{2} means to multiply the base number or variable times itself.
   6^2 = 6 times 6 (it does not mean 6 times 2)
   x^2 = *x* times *x* (it does not mean *x* times 2)

1. Algebraic Expressions

Example 1
It takes 2 hours for Ann to make 1 necklace. Which expression represents the number of hours it will take to fill an order for x necklaces?
A) $2 + x$ B) $x - 2$ C) $2(x + 2)$ D) $2x$ E) $2 - x$

The time needed is the number of hours to make 1 necklace times the number of necklaces.
2 hours times x necklaces → $2x$
Answer: D) $2x$

Example 2
A new cd costs m dollars. Which expression represents the cost of 7 cds?
A) $7 + m$ B) $m - 7$ C) $7m$ D) $7 - m$ E) $7 + 7m$

The cost of 7 cds is 7 times the cost of 1 cd.
7 times m → $7m$.
Answer: C) $7m$

Example 3
It costs x dollars to buy a washer, and y dollars to buy a dryer. Which expression shows the cost of buying a washer and a dryer?
A) xy B) $x + y$ C) $x - y$ D) $2x + 2y$ E) $2x + y$

1 washer costs x dollars and 1 dryer costs y dollars. Add together to get the cost of both.
Answer: B) $x + y$

Example 4
Using the information from Example 3, which expression shows the cost of putting a washer and dryer in each of 6 different apartments?
A) $6 + x + y$ B) $6x + y$ C) $6(x + y)$ D) $3x + 3y$ E) $(xy)^6$

Multiply the cost of 1 washer and 1 dryer, which is $(x + y)$, times 6.
Answer: C) $6(x + y)$ This could also have been expressed as $6x + 6y$.

Example 5
If Julian earns x dollars per month and LeAnn earns $400 more per month than Julian, which expression shows the total earned by LeAnn and Julian.
A) $2x + 400$ B) $x + 400$ C) $400x$ D) $x + 400x$ E) $400x^2$

Total earned is equal to Julian's pay plus LeAnn's pay.

Julian's pay: Given as x dollars.
LeAnn's pay: $400 more than Julian → $x + 400$.
Add together: $x + x + 400 = 2x + 400$
Answer: A) $2x + 400$

Example 6
In a bookkeeping office, each trainee can process an average of 25 invoices per hour, and each experienced clerk can process an average of 40 invoices per hour. If there are x trainees and y experienced clerks, which expression shows the total number of invoices processed per hour by all the trainees and experienced clerks?
A) $25x + 40y$ B) $40x + 25y$ C) $25(x + y)$ D) $65xy$ E) $65(x + y)$

Total invoices processed in 1 hour are the invoices processed by all of the trainees in 1 hour plus the invoices processed by all of the experienced clerks in 1 hour.

Trainee Invoices: Number of invoices 1 trainee can process in 1 hour, times number of trainees → $25x$.
Experienced Clerk Invoices: Number of invoices 1 experienced clerk can process in 1 hour, times number of experienced clerks → $40y$.
Add together: $25x + 40y$
Answer: A) $25x + 40y$

Example 7
Using information from Example 6, if all employees work 40 hours per week, which expression shows the total invoices processed in a week by all the trainees and experienced clerks?
A) $40(x + y)$ B) $25x + 40y + 40$ C) $40xy$
D) $40x + 25y + 40$ E) $40(25x + 40y)$

From Example 6, the total number of invoices processed in 1 hour is $25x + 40y$. Multiply this quantity times 40 hours.
Answer: E) $40(25x + 40y)$ This could also have been shown as $1{,}000x + 1{,}600y$.

Practice One *Answers – p. 11*

1. A box of cereal costs \$4. Which expression represents the cost of m boxes of cereal?
A) $4 + m$ B) $4m$ C) $4m^2$ D) $m - 4$ E) $4 - m$

2. John can walk to the park and back in 2 hours. If he does this x times per week, how many hours does he spend walking each week?
A) $2 + x$ B) $2x^2$ C) $x - 2$ D) $2x$ E) $2 - x$

3. Travis promises to study math 2 more hours per week than his classmate Julio. If Julio studies x hours per week, how many hours does Travis have to study to keep his promise?
A) $2x$ B) x^2 C) $x + 2$ D) $2 - x$ E) $x - 2$

4. A bag of chips costs \$4 and a container of dip costs \$3. Which expression represents the cost of chips and dip for a party where m bags of chips and n containers of dip are needed?
A) $4n + 3m$ B) $7(m + n)$ C) $4 + n + 3 + m$ D) $12mn$ E) $4m + 3n$

5. If cooks earn \$15 per hour and servers earn \$12 per hour, what is the total hourly cost of x cooks and y servers?
A) $15x + 12y$ B) $27xy$ C) $12x + 15y$
D) $15 + x + 12 + y$ E) $27(x + y)$

6. Sandria is in charge of sending chocolates to her company's top clients at Christmas. She has chosen the Deluxe Assortment for Priority clients, and the Grand Assortment for Preferred Clients. The Deluxe Assortment costs \$35, and the Grand Assortment costs \$22. Which expression shows the total cost if there are x Priority clients and y Preferred clients?
A) $22x + 35y$ B) $35x + 22y$ C) $(22 + 35)(xy)$ D) $57(x + y)$ E) $57 + x + y$

7. Salespeople at Superdome Electronics earn \$1,200 per month base pay, plus commissions of \$20 for each TV they sell, \$35 for each complete computer system they sell, and \$5 for each small electronic item they sell. Which expression could be used to calculate Damon's total pay last month if he sold a TVs, b complete computer systems, and c small electronic items?
A) $1{,}200 + 60(a + b + c)$ B) $1{,}200 + 35a + 20b + 5c$ C) $60(a + b + c)$
D) $1{,}200 + 20a + 35b + 5c$ E) $1{,}200 + 60abc$

8. Pens cost \$3 per pack of 12, and pencils cost \$2 per pack of 12. Which expression can be used to find the total cost of pens and pencils if x packs of pens and y packs of pencils are ordered?

A) $6xy$ B) $12x + 3y$ C) $3x + 2y$ D) $5xy$ E) $12(x + y)$

2. Algebraic Functions

We have just seen how to express a situation or formula that is given in words as an algebraic expression. Situations or formulas given in words can also be expressed as algebraic functions. Expressions do not have an equal sign, and functions do have an equal sign.

Situation: John earns \$400 per week plus a \$30 commission for every sale he makes. What is his total pay in a week where he makes x sales?

Shown as an algebraic expression:
Total pay per week is equal to his per week salary plus his commission.
Per week salary: Given as \$400.
Commission: Commission rate time number of sales → $30x$.
Total pay as an expression: $400 + 30x$

Shown as an algebraic function:
Total pay can also be shown as a function: $f(x) = 400 + 30x$
This is read as f of x equals $400 + 30x$.
You can think of $f(x)$ as a symbol that represents total pay when there are x sales.
This is called function notation of an equation, and can be thought of as a way to express what the total will be when a given number is substituted for x.

Note – $f(x)$ does not mean f times x, even though that is what it looks like.
$f(x)$ is a special mathematical symbol that represents what the total will be when a given number is substituted for x.

If you are told that there are 6 sales, then $x = 6$, and solving this problem would look like this:

$f(x) = 400 + 30x$ Start by writing down the function.
$f(6) = 400 + (30)(6)$ Substitute 6 for x.
$f(6) = 400 + 180$ Calculate.
$f(6) = 580$ When x equals 6, $f(6)$, or total pay, equals 580.

Example 1
Car salesmen earn $200 base pay per week, plus $600 commission for each car that they sell. If x represents the number of cars sold in 1 week, which function could be used to calculate a salesman's weekly pay for x cars sold?

A) $f(x) = 200x + 600x$ B) $f(x) = 800 + x$ C) $f(x) = 200(x + 600)$
D) $f(x) = 200 + 600x$ E) $f(x) = 600 + 200x$

Weekly pay for x cars is represented by $f(x)$, and is equal to base pay plus commission.

Base pay: Given as $200.
Commission: $600 times the number of cars → $600x$.
Answer: D) $f(x) = 200 + 600x$

NOTE – In this type of problem, the costs are sometimes described as fixed and variable. The fixed cost, in this problem base pay, is always the same and is paid no matter how many cars are sold. The variable cost, in this problem commission pay, varies, depending on how many cars are sold.

Example 2
Soccer jerseys cost $18 each and soccer shorts cost $10 each. Which function shows the cost to outfit a team of x players with 1 jersey and 1 pair of shorts for each player?

A) $f(x) = x + 18 + 10$ B) $f(x) = 28x^2$ C) $f(x) = 18x + 10x$
D) $f(x) = 18x + 10$ E) $f(x) = 10x + 18$

Total cost for x players is represented by $f(x)$, and is equal to the cost of the jerseys plus the cost of the shorts.

Jerseys: Cost for 1 jersey times the number of players → $18x$.
Shorts: Cost for 1 pair of shorts times the number of players → $10x$.
Answer: C) $f(x) = 18x + 10x$ This could also be shown as $f(x) = 28x$.

Example 3
A poster printing company charges a one-time design fee of $150 plus 75 cents per poster printed. Which function represents the total cost to print x posters?

A) $f(x) = 150 + 75x$ B) $f(x) = 150 + 0.75x$ C) $f(x) = 150 + x$
D) $f(x) = 150x + 75$ E) $f(x) = 150x + 0.75$

Total cost for x posters is represented by $f(x)$, and is equal to the one-time design fee plus the poster printing fee.

One-time fee: Given as $150.
Poster printing fee: Cost for 1 poster times the number of posters → $0.75x$.
Answer: B) $f(x) = 150 + 0.75x$

CAREFUL – 75 cents is 0.75. Don't use 75, which is 75 dollars.

Example 4

An old machine makes 2 parts per hour and a newer model machine makes 3 parts per hour. Which function represents the number of parts made by both machines in x hours?

A) $f(x) = 5x^2$ B) $f(x) = 6x$ C) $f(x) = 2x + 3$
D) $f(x) = 3x + 2$ E) $f(x) = 5x$

Total number of parts is represented by $f(x)$, and is equal to the parts made by the old machine plus the parts made by the new machine.

Parts made by old machine: Parts made in 1 hour times number of hours → $2x$.
Parts made by new machine: Parts made in 1 hour times number of hours → $3x$.
Add together: $2x + 3x = 5x$
Answer: E) $f(x) = 5x$ This could also be expressed as $f(x) = 2x + 3x$.

Example 5

A manufacturing company makes twice as many Model A machines as Model B machines. If there are x Model B machines made, which function represents the total number of machines made?

A) $f(x) = x + 2$ B) $f(x) = 2x$ C) $f(x) = 3x$
D) $f(x) = 2 - x$ E) $f(x) = 2(x + 2)$

Total number of machines made is represented by $f(x)$, and is equal to the number of Model A machines plus the number of Model B machines.

Model B machines: Given as x.
Model A machines: Twice the number of Model B machines, or 2 times x → $2x$.
Add together: $x + 2x = 3x$
Answer: C) $f(x) = 3x$ This could also be expressed as $f(x) = x + 2x$.

Note – Model B machines are determined before the Model A machines. This is because the problem tells you that there are x Model B machines, and the number of Model A machines is then determined by its relationship to the number of Model B machines.
If some quantity is defined as x, it usually makes sense to start with that quantity.

Example 6

The function $f(x) = 175 + 12x$ represents the cost of having a birthday party at a restaurant, where x is the number of guests. What is the cost in dollars of a birthday party for 25 guests?

A) 475 B) $175 + 12x$ C) 300 D) $187x$ E) 187

In this problem you are given the function and asked to calculate the total when a value of x is supplied. Total cost is represented by $f(x)$, and is calculated by substituting the given value for x.

$f(x) = 175 + 12x$	Start by writing out the function.
$f(25) = 175 + (12 \times 25)$	Substitute the given value for x.
$f(25) = 175 + 300$	Calculate.
total cost = 475	

Answer: A) 475

Practice Two *Answers – p. 13*

1. A bakery makes 150 more chocolate chip cookies than oatmeal cookies. Which function shows the number of chocolate chip cookies made if there are x oatmeal cookies made?

A) $f(x) = 150x$ B) $f(x) = 2x + 150$ C) $f(x) = x - 150$
D) $f(x) = x + 150$ E) $f(x) = 150 \div x$

2. If a workbook costs \$2, which function represents the cost of x workbooks?

A) $f(x) = 2x$ B) $f(x) = 2 - x$ C) $f(x) = x - 2$
D) $f(x) = x + 2$ E) $f(x) = 2 \div x$

3. To rent out the bowling alley for a private party, it costs a base fee of \$600 plus \$20 for each person attending the party. Which function can be used to calculate the cost to rent out the bowling alley for a party for x people?

A) $f(x) = x(600 + 20)$ B) $f(x) = 600x + 20$ C) $f(x) = 600 + 20x$
D) $f(x) = 620x^2$ E) $f(x) = x + 600 + 20$

4. The function $f(x) = 200 + 4x$ is used by a company to calculate the cost of installing a tile floor, where x is the number of square feet of floor to be tiled. What will the installation charge in dollars be for a floor that is 150 square feet?

A) $200 + 4x$ B) 350 C) 600 D) 800 E) $800x$

5. Life insurance salespeople earn a base pay of $900 per month plus a $50 commission for each policy sold. Which function represents the total monthly pay for a salesman who sells x policies in a month?

A) $f(x) = 900 + 50$ B) $f(x) = 900x + 50$ C) $f(x) = x(900 + 50)$
D) $f(x) = 900x - 50x$ E) $f(x) = 900 + 50x$

6. It costs $225 to paint an apartment and $310 to carpet an apartment. Which function shows the total cost to paint and carpet x apartments?

A) $f(x) = 225x + 310x$ B) $f(x) = 535x^2$ C) $f(x) = x + 225 + 310$
D) $f(x) = 225x + 310$ E) $f(x) = 310x + 225$

7. A fitness center charges a $35 membership fee per month, plus a charge of $7 for every exercise class taken. Which function represents the total monthly cost for a member who takes x classes?

A) $f(x) = 35x + 7$ B) $f(x) = 35 + 7x$ C) $f(x) = 35x - 7$
D) $f(x) = 35x + 7x$ E) $f(x) = 35 - 7x$

8. A large work team can produce 47 parts per hour, and a smaller team can only make 36 parts per hour. Which function shows the number of parts made when both teams work x hours?

A) $f(x) = 47x - 36x$ B) $f(x) = 83x$ C) $f(x) = 83x^2$
D) $f(x) = 47x + 36$ E) $f(x) = 47 - 36x$

9. The function $f(x) = x^2 + 4x - 16$ is used to calculate a coefficient in a scientific application where x is the number of inches. What is the coefficient for 3 inches?

A) $x^2 + 4x$ B) 2 C) 5 D) $5x^2$ E) $5x$

10. A bakery supplies a restaurant with freshly baked bread, and the restaurant always gets 3 times as many wheat rolls as white rolls. It they order x white rolls, which function shows the total number of rolls ordered?

A) $f(x) = x + 3$ B) $f(x) = 3x$ C) $f(x) = 3 - x$
D) $f(x) = 4x$ E) $f(x) = 2(x + 3)$

Challenger One *Answer – p. 16*

A scarf costs \$5 more than the matching hat. If the hat costs x dollars, which function shows the cost of 12 hat and scarf sets?

A) $f(x) = 12x + 12(x + 5)$ B) $f(x) = 12x + 5x$ C) $f(x) = 12x + 5$

D) $f(x) = 24x + 5$ E) $f(x) = 12(x + 5)$

Challenger Two *Answer – p. 17*

A company employs 10 supervisors and 300 call takers in their customer service department, and supervisors earn \$250 more per week than call takers earn. If x represents the weekly pay of a call taker, which function shows the weekly pay of all the supervisors and call takers?

A) $f(x) = 300x + 10x$ B) $f(x) = 250x + 310$ C) $f(x) = 300x + x + 250$

D) $f(x) = 250 + 10x + 300x$ E) $f(x) = 300x + 10(x + 250)$

ANSWER KEY Lesson 7 Algebraic Expressions & Functions

Practice One

1. A box of cereal costs \$4. Which expression represents the cost of m boxes of cereal?

A) $4 + m$ B) $4m$ C) $4m^2$ D) $m - 4$ E) $4 - m$

Cost is price for 1 box of cereal box times the number of boxes.
4 times m → $4m$
Answer: B) $4m$

2. John can walk to the park and back in 2 hours. If he does this x times per week, how many hours does he spend walking each week?

A) $2 + x$ B) $2x^2$ C) $x - 2$ D) $2x$ E) $2 - x$

Time spent walking is the time for each walk times the number of walks.
2 times x → $2x$
Answer: D) $2x$

3. Travis promises to study math 2 more hours per week than his classmate Julio. If Julio studies x hours per week, how many hours does Travis have to study to keep his promise?

A) $2x$ B) x^2 C) $x + 2$ D) $2 - x$ E) $x - 2$

Travis has to study the amount Julio studies plus 2 more hours.
Julio's study hours plus 2 → $x + 2$.
Answer: C) $x + 2$

4. A bag of chips costs \$4 and a container of dip costs \$3. Which expression represents the cost of chips and dip for a party where m bags of chips and n containers of dip are needed?

A) $4n + 3m$ B) $7(m + n)$ C) $4 + n + 3 + m$ D) $12mn$ E) $4m + 3n$

Cost of chips: Per bag cost of \$4 times the number of bags → $4m$.
Cost of dip: Per container cost of \$3 times the number of containers → $3n$.
Answer: E) $4m + 3n$

5. If cooks earn \$15 per hour and servers earn \$12 per hour, what is the total hourly cost of x cooks and y servers?

A) $15x + 12y$ B) $27xy$ C) $12x + 15y$
D) $15 + x + 12 + y$ E) $27(x + y)$

Hourly cost of cooks: Per hour rate of \$15 times the number of cooks → $15x$.
Hourly cost of servers: Per hour rate of \$12 times the number of servers → $12y$.
Answer: A) $15x + 12y$

6. Sandria is in charge of sending chocolates to her company's top clients at Christmas. She has chosen the Deluxe Assortment for Priority clients, and the Grand Assortment for Preferred Clients. The Deluxe Assortment costs \$35, and the Grand Assortment costs \$22. Which expression shows the total cost if there are x Priority clients and y Preferred clients?

A) $22x + 35y$ B) $35x + 22y$ C) $(22 + 35)(xy)$ D) $57(x + y)$ E) $57 + x + y$

Priority clients cost: Number of Priority clients times cost of Deluxe Assortment → $35x$.
Preferred clients cost: Number of Preferred clients times cost of Grand Assortment → $22y$.
Answer: B) $35x + 22y$

7. Salespeople at Superdome Electronics earn \$1,200 per month base pay, plus commissions of \$20 for each TV they sell, \$35 for each complete computer system they sell, and \$5 for each small electronic item they sell. Which expression could be used to calculate Damon's total pay last month if he sold a TVs, b complete computer systems, and c small electronic items?

A) $1{,}200 + 60(a + b + c)$ B) $1{,}200 + 35a + 20b + 5c$ C) $60(a + b + c)$
D) $1{,}200 + 20a + 35b + 5c$ E) $1{,}200 + 60abc$

Damon's total pay is equal to:
base salary + TV commission + computer system commission + small item commission
\$1,200 + **$20a$** + **$35b$** + **$5c$**

Base pay: Given as **\$1,200**.
TV commission: Number of TVs times commission per TV → **$20a$**.
Computer system commission: Number of systems times commission per system → **$35b$**.
Small item commission: Number of small items times commission per small item → **$5c$**.
Answer: D) $1{,}200 + 20a + 35b + 5c$

8. Pens cost \$3 per pack of 12, and pencils cost \$2 per pack of 12. Which expression can be used to find the total cost of pens and pencils if x packs of pens and y packs of pencils are ordered?

A) $6xy$ B) $12x + 3y$ C) $3x + 2y$ D) $5xy$ E) $12(x + y)$

Pens: Cost per pack times number of packs → $3x$.
Pencils: Cost per pack times number of packs → $2y$.
Answer: C) $3x + 2y$

NOTE – The number of pens and pencils inside the packs does not enter into the calculation because costs and quantities are given per pack, not per pen or pencil.

Practice Two

1. A bakery makes 150 more chocolate chip cookies than oatmeal cookies. Which function shows the number of chocolate chip cookies made if there are x oatmeal cookies made?

A) $f(x) = 150x$ B) $f(x) = 2x + 150$ C) $f(x) = x - 150$
D) $f(x) = x + 150$ E) $f(x) = 150 \div x$

The number of chocolate chip cookies is represented by $f(x)$.

Number of oatmeal cookies: Given as x.
Number of chocolate chip cookies: Number of oatmeal cookies plus 150 more → $x + 150$.
Answer: D) $f(x) = x + 150$

NOTE – Be sure to read the question carefully so you are answering exactly the question that is asked. This question asks for a function that shows the number of chocolate chip cookies.

The question could also have asked for a function that shows the total number of cookies.
Total cookies would be oatmeal cookies plus chocolate chip cookies:
$x + x + 150$ → $f(x) = 2x + 150$

2. If a workbook costs \$2, which function represents the cost of x workbooks?

A) $f(x) = 2x$ B) $f(x) = 2 - x$ C) $f(x) = x - 2$
D) $f(x) = x + 2$ E) $f(x) = 2 \div x$

The cost of the workbooks is represented by $f(x)$.
Cost is price per workbook times number of workbooks → $2x$.
Answer: A) $f(x) = 2x$

3. To rent out the bowling alley for a private party, it costs a base fee of $600 plus $20 for each person attending the party. Which function can be used to calculate the cost to rent out the bowling alley for a party for x people?

A) $f(x) = x(600 + 20)$ B) $f(x) = 600x + 20$ C) $f(x) = 600 + 20x$
D) $f(x) = 620x^2$ E) $f(x) = x + 600 + 20$

Total cost for a party for x people is represented by $f(x)$, and is equal to the base fee plus the per person fee.

Base fee: Given as $600.
Per person fee: $20 per person times the number of people → $20x$.
Answer: C) $f(x) = 600 + 20x$

4. The function $f(x) = 200 + 4x$ is used by a company to calculate the cost of installing a tile floor, where x is the number of square feet of floor to be tiled. What will the installation charge in dollars be for a floor that is 150 square feet?

A) $200 + 4x$ B) 350 C) 600 D) 800 E) $800x$

In this problem you are given the function and asked to calculate the total when a value of x is supplied. The installation charge is represented by $f(x)$, and is calculated by substituting the given value for x.

$f(x) = 200 + 4x$ Start by writing out the function.
$f(150) = 200 + (4 \times 150)$ Substitute the given value for x.
$f(150) = 200 + 600$ Calculate.
Installation charge = 800
Answer: D) 800

5. Life insurance salespeople earn a base pay of $900 per month plus a $50 commission for each policy sold. Which function represents the total monthly pay for a salesman who sells x policies in a month?

A) $f(x) = 900 + 50$ B) $f(x) = 900x + 50$ C) $f(x) = x(900 + 50)$
D) $f(x) = 900x - 50x$ E) $f(x) = 900 + 50x$

Monthly pay is represented by $f(x)$, and is equal to base pay plus commission.

Base pay: Given as $900.
Commission: Commission per policy sold times the number of policies sold → $50x$.
Answer: E) $f(x) = 900 + 50x$

6. It costs \$225 to paint an apartment and \$310 to carpet an apartment. Which function shows the total cost to paint and carpet x apartments?

A) $f(x) = 225x + 310x$ B) $f(x) = 535x^2$ C) $f(x) = x + 225 + 310$
D) $f(x) = 225x + 310$ E) $f(x) = 310x + 225$

Total cost for x apartments is represented by $f(x)$, and is equal to cost to paint plus cost to carpet.

Paint: Cost per apartment times the number of apartments → $225x$.
Carpet: Cost per apartment times the number of apartments → $310x$.
Answer: A) $f(x) = 225x + 310x$ This could also be shown as $f(x) = 535x$.

7. A fitness center charges a \$35 membership fee per month, plus a charge of \$7 for every exercise class taken. Which function represents the total monthly cost for a member who takes x classes?

A) $f(x) = 35x + 7$ B) $f(x) = 35 + 7x$ C) $f(x) = 35x – 7$
D) $f(x) = 35x + 7x$ E) $f(x) = 35 – 7x$

Total monthly cost is represented by $f(x)$, and is equal to the monthly fee plus the charge for classes taken.

Monthly fee: Given as \$35.
Classes taken charge: Cost per class times the number of classes → $7x$.
Answer: B) $f(x) = 35 + 7x$

8. A large work team can produce 47 parts per hour, and a smaller team can only make 36 parts per hour. Which function shows the number of parts made when both teams work x hours?

A) $f(x) = 47x – 36x$ B) $f(x) = 83x$ C) $f(x) = 83x^2$
D) $f(x) = 47x + 36$ E) $f(x) = 47 – 36x$

Total number of parts is represented by $f(x)$, and is equal to the parts made by the large work team plus the parts made by the small work team.

Parts made by large work team: Parts per hour times number of hours → $47x$.
Parts made by small work team: Parts per hour times number of hours → $36x$.
Add together: $47x + 36x = 83x$
Answer: B) $f(x) = 83x$ This also could have be shown as $f(x) = 47x + 36x$.

9. The function $f(x) = x^2 + 4x - 16$ is used to calculate a coefficient in a scientific application where x is the number of inches. What is the coefficient for 3 inches?
A) $x^2 + 4x$ B) 2 C) 5 D) $5x^2$ E) $5x$

In this problem you are given the function and asked to calculate a coefficient when a value of x is supplied. The coefficient is represented by $f(x)$, and is calculated by substituting the given value for x.

$f(x) = x^2 + 4x - 16$ Start by writing out the function.
$f(3) = 3^2 + (4 \times 3) - 16$ Substitute the given value for x.
$f(3) = 9 + 12 - 16$ Calculate.
Coefficient = 5
Answer: C) 5

10. A bakery supplies a restaurant with freshly baked bread, and the restaurant always gets 3 times as many wheat rolls as white rolls. It they order x white rolls, which function shows the total number of rolls ordered?
A) $f(x) = x + 3$ B) $f(x) = 3x$ C) $f(x) = 3 - x$
D) $f(x) = 4x$ E) $f(x) = 2(x + 3)$

Total number of rolls is represented by $f(x)$, and is equal to the number of white rolls plus the number of wheat rolls.

White rolls: Given as x.
Wheat rolls: 3 times the number of white rolls → $3x$.
Add together: $x + 3x$
Answer: D) $f(x) = 4x$ This could also be expressed as $f(x) = x + 3x$.

Challenger One

A scarf costs \$5 more than the matching hat. If the hat costs x dollars, which function shows the cost of 12 hat and scarf sets?
A) $f(x) = 12x + 12(x + 5)$ B) $f(x) = 12x + 5x$ C) $f(x) = 12x + 5$
D) $f(x) = 24x + 5$ E) $f(x) = 12(x + 5)$

Total cost is represented by $f(x)$, and is equal to the cost of 12 hats plus 12 scarves.

Hats: Cost of 1 hat is given as x, so 12 hats cost $12x$.
Scarves: Cost of 1 scarf is \$5 more than the hat or $x + 5$, so 12 scarves cost $12(x + 5)$.
Add together: $12x + 12(x + 5)$
Answer: A) $f(x) = 12x + 12(x + 5)$ This could also be expressed as $f(x) = 24x + 60$.

Challenger Two

A company employs 10 supervisors and 300 call takers in their customer service department, and supervisors earn $250 more per week than call takers earn. If x represents the weekly pay of a call taker, which function shows the weekly pay of all the supervisors and call takers?

A) $f(x) = 300x + 10x$ B) $f(x) = 250x + 310$ C) $f(x) = 300x + x + 250$
D) $f(x) = 250 + 10x + 300x$ E) $f(x) = 300x + 10(x + 250)$

Weekly pay is represented by $f(x)$, and is equal to the weekly pay of all the call takers plus the weekly pay of all the supervisors.

Call taker pay: Given as x for 1 call taker, so pay for 300 call takers = $300x$.
Supervisor pay: A supervisor earn $250 more than a call taker, and call takers earn x, so
1 supervisor earns $x + 250$.
10 supervisors earn 10 times this quantity → $10(x + 250)$.
Add together : $300x + 10(x + 250)$

Answer: E) $f(x) = 300x + 10(x + 250)$
This could also be expressed as $f(x) = 310x + 2{,}500$.

It can be helpful to make a quick chart to organize the information. Set up two columns, Supervisors and Call Takers, and as you read, note down the information in the correct column.

	Supervisors	Call Takers
Quantity:	10	300
Pay:	$250 more than call takers → $x + 250$	x