LINEAR FUNCTIONS

A DEFINITION

A.1 FINDING THE FUNCTION FROM A MACHINE PROCESS

Ex 1: Consider the following calculation program:

1. Choose a number.
2. Multiply by 5.
3. Add 2.

Let x be the chosen number. Find the function that gives the output of this program.

$$f(x) = \square$$

Ex 2: Consider the following calculation program:

1. Choose a number.
2. Multiply by 2.
3. Subtract 3.

Let x be the chosen number. Find the function that gives the output of this program.

$$f(x) = \square$$

Ex 3: Consider the following calculation program:

1. Choose a number.
2. Divide by 2.
3. Add 2.

Let x be the chosen number. Find the function that gives the output of this program.

$$f(x) = \square$$

Ex 4: Consider the following calculation program:

1. Choose a number.
2. Multiply by $\frac{2}{3}$.
3. Subtract 2.

Let x be the chosen number. Find the function that gives the output of this program.

$$f(x) = \square$$

A.2 MODELING SITUATIONS WITH LINEAR FUNCTIONS

Ex 5: A mechanic charges a \$40 call-out fee and \$30 per hour thereafter.
Find the mechanic's fee $M(x)$ for a job which takes x hours.

$$M(x) = \square$$

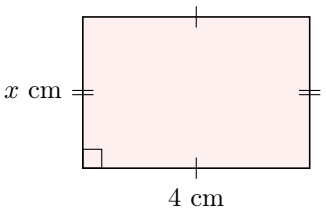
Ex 6: A taxi company charges a \$5 pick-up fee and \$2 per kilometer traveled.
Find the total fare $T(x)$ for a trip of x kilometers.

$$T(x) = \square$$

Ex 7: The temperature T in degrees Fahrenheit (°F) is related to the temperature x in degrees Celsius (°C) by the following rule:
Multiply by 1.8, then add 32.
Write the function that expresses T as a function of x.

$$T(x) = \square$$

Ex 8: A rectangle has a fixed width of 4 cm. Its length is x cm.



Express the perimeter $P(x)$ of the rectangle as a function of its length x.

$$P(x) = \square$$

Ex 9: A water tank already contains 35 liters of water and fills at a rate of 10 liters per minute. Let x be the number of minutes the tank has been filling. Find $f(x)$ be the total amount of water in the tank in liters.

$$f(x) = \square \text{ liters}$$

Ex 10: A person starts walking at a constant speed of 5 kilometers per hour from a starting point that is 10 kilometers away from their destination. Let x be the number of hours they have been walking. Find $f(x)$ be the distance remaining to their destination in kilometers.

$$f(x) = \square \text{ kilometers}$$

A.3 FINDING a AND b

Ex 11: For the linear function $f(x) = 2x+1$, find the coefficients in the form $f(x) = ax + b$:

$$a = \square \text{ and } b = \square$$

Ex 12: For the linear function $f(x) = 5x-2$, find the coefficients in the form $f(x) = ax + b$:

$a =$ ☐ and $b =$ ☐

Ex 13: For the linear function $f(x) = -x - 3$, find the coefficients in the form $f(x) = ax + b$:

$a =$ ☐ and $b =$ ☐

Ex 14: For the linear function $f(x) = 3-2x$, find the coefficients in the form $f(x) = ax + b$:

$a =$ ☐ and $b =$ ☐

A.4 FINDING $f(x)$

Ex 15: For $f(x) = 3x + 4$, find:

$f(2) =$ ☐

Ex 16: For $f(x) = -2x + 8$, find:

$f(3) =$ ☐

Ex 17: For $f(x) = \frac{1}{2}x + \frac{1}{2}$, find:

$f(3) =$ ☐

Ex 18: For $f(x) = -x - 1$, find:

$f(-1) =$ ☐

A.5 FINDING x FOR $f(x) = c$

Ex 19: For $f(x) = 3x + 2$, find x for $f(x) = 14$:

$x =$ ☐

Ex 20: For $f(x) = 5x - 3$, find x for $f(x) = 32$:

$x =$ ☐

Ex 21: For $f(x) = -2x + 1$, find x for $f(x) = 5$:

$x =$ ☐

Ex 22: For $f(x) = 6x + 1$, find x for $f(x) = 10$:

$x =$ ☐

A.6 IDENTIFYING LINEAR FUNCTIONS

MCQ 23: Is $f(x) = 2x + 1$ a linear function?

☐ Yes

☐ No

MCQ 24: Is $f(x) = x^2 + 2x - 1$ a linear function?

☐ Yes

☐ No

MCQ 25: Is $f(x) = -2 + 2x$ a linear function?

☐ Yes

☐ No

MCQ 26: Is $f(x) = \frac{2}{x}$ a linear function?

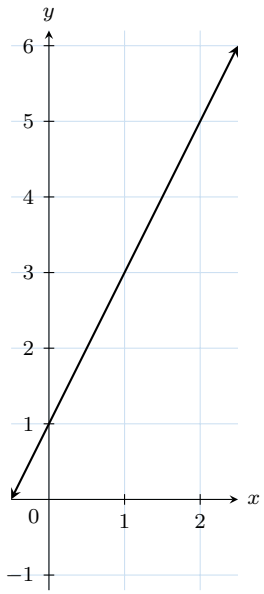
☐ Yes

☐ No

B GRAPH

B.1 FINDING THE FUNCTION FROM THE GRAPH

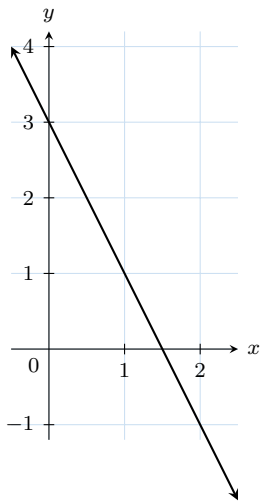
Ex 27: The graph of the function is shown below:



Find the function:

$f(x) =$ ☐

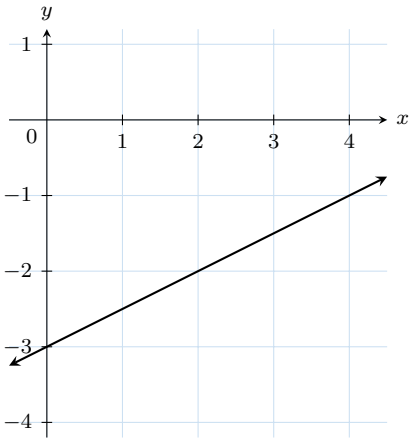
Ex 28: The graph of the function is shown below:



Find the function:

$f(x) =$ ☐

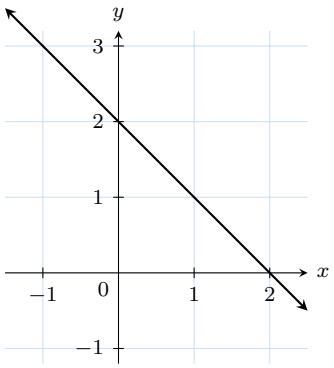
Ex 29: The graph of the function is shown below:



Find the function:

$f(x) =$ ☐

Ex 30: The graph of the function is shown below:

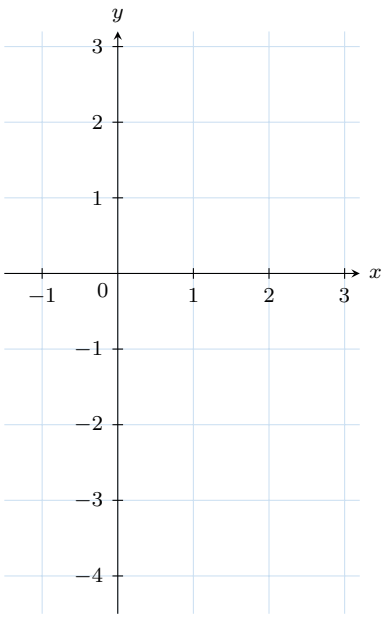


Find the function:

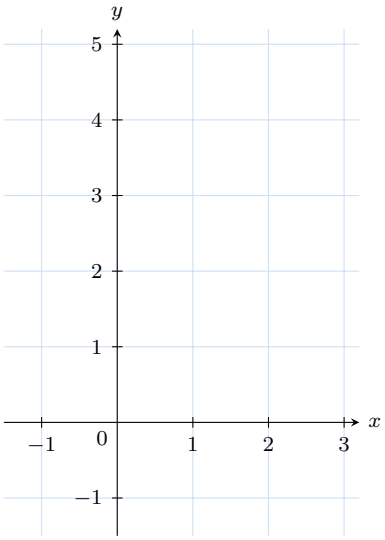
$f(x) =$ ☐

B.2 PLOTTING LINES FROM LINEAR FUNCTION

Ex 31: Plot the graph of the function $f(x) = 2x - 1$:



Ex 32: Plot the graph of the function $f(x) = -2x + 4$:



Ex 33: Plot the graph of the function $f(x) = \frac{1}{2}x - 2$: