

### 5.7 Interpreting Graphs of Linear Functions

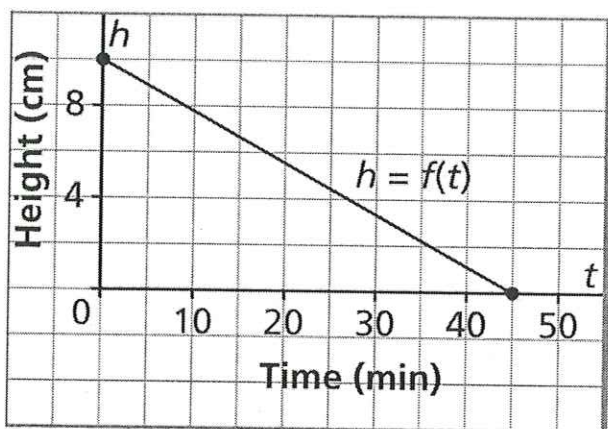
Definitions:

The **x-intercept** (or **horizontal intercept**) is where the graph of the function intersects the x-axis. *Also,  $y=0$  here.*

The **y-intercept** (or **vertical intercept**) is where the graph of the function intersects the y-axis. *Also,  $x=0$  here.*

Example: This graph shows how the height of a burning candle changes with time.

**Height of a Burning Candle**



a) Determine the coordinates of the x and y-intercepts. Describe what these points represent in the context of the problem.

*x-int: (45, 0) It takes 45 min for the candle to burn out.*

*y-int: (0, 10) The candle's initial height is 10 cm*

b) What are the domain and range of this function?

*D:  $\{t \mid 0 \leq t \leq 45\}$*

*R:  $\{h \mid 0 \leq h \leq 10\}$*

c) What is the rate of change?

Example: Determine the x and y-intercepts and one other point, then sketch a graph of the linear function  $f(x) = 4x - 3$ .

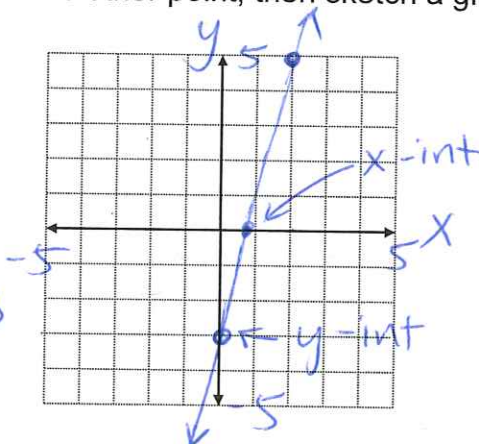
*x-int: let  $y=0$   $0=4x-3$*

$$3=4x$$

$$x = \frac{3}{4}$$

*y-int: let  $x=0$   $y=4(0)-3$*

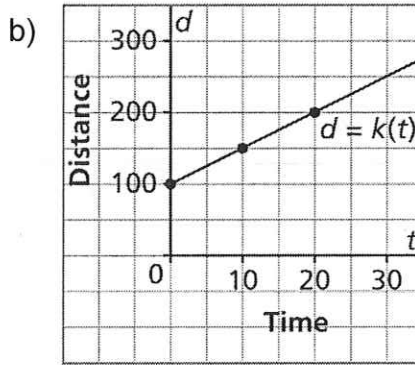
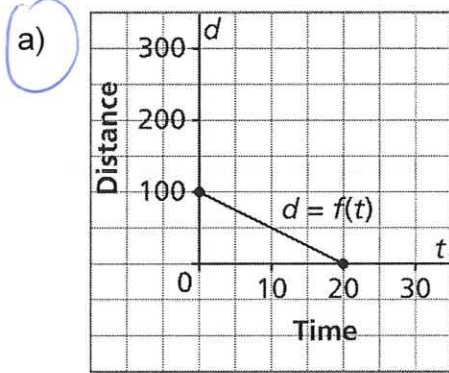
$$y = -3$$



*Other point: choose  $x=2$   $f(2) = 4(2) - 3$   
 $= 5$   $(2, 5)$*

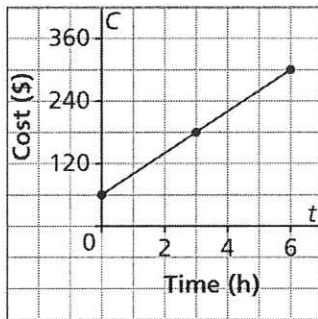
negative rate of change

Example: Which graph has a rate of change of  $-5$  and a vertical intercept of  $100$ ? Justify your answer.



Example: This graph shows the total cost for a house call by an electrician for up to 6 h work. The electrician charges \$190 to complete a job. For how many hours did she work?

Cost of an Electrician's House Call



$C(0) = \$60$  (initial fee)

Rate =  $\frac{300 - 180}{6 - 3} = \frac{120}{3} = \$40/h$

$C(t) = 60 + 40t$

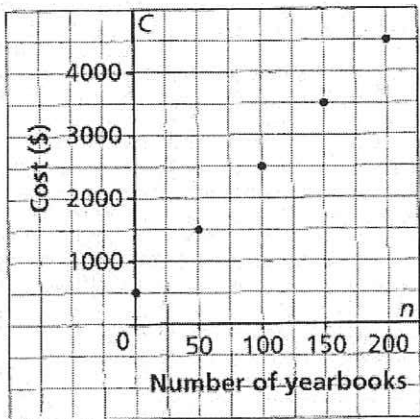
$190 = 60 + 40t$

$130 = 40t$

$t = 3.25 \text{ hours}$

Example: This graph shows the cost of publishing a school yearbook. The budget for publishing costs is \$4200.

Cost of publishing a Yearbook



a) What is the maximum number of books that can be printed?

150

b) Why are the points not joined?

You can only purchase books in multiples of 50.

c) Determine the domain and range.

D:  $\{0, 50, 100, 150, 200\}$

R:  $\{500, 1500, 2500, 3500, 4500\}$