

Function Form Switch

Rewrite linear functions to spotlight key features.

GRADE 8 • 8.FGR.5.6

8.FGR.5.6 "Write a linear function defined by an expression in different but equivalent forms to reveal and explain different properties of the function."

NAME _____

DATE _____

CHOOSE THE USEFUL FORM

For a nonhorizontal linear function, $f(x)=mx+b$ can also be written as $f(x)=m(x-r)$, where r is the x -intercept. Slope-intercept form shows the slope m and y -intercept b . Factored form shows the slope m and x -intercept r .

WORKED EXAMPLE

Write $f(x)=11x-77$ in a form that reveals its x -intercept.

1. Factor out 11: $f(x)=11(x-7)$.
2. The factor $x-7$ equals 0 when $x=7$.
3. So the x -intercept is 7.

Answer: $f(x)=11(x-7)$; slope = 11, x -intercept = 7

PRACTICE 6 problems

- 1** Write $f(x)=2x+8$ in factored form. Then name the x -intercept.

ANSWER _____

- 2** Write $f(x)=-3x+12$ in factored form. Then name the x -intercept.

ANSWER _____

- 3** Expand $f(x)=4(x+2)$. Then name the slope and y -intercept.

ANSWER _____

- 4** For $f(x)=-2(x-6)$, name the slope and x -intercept.

ANSWER _____

- 5** For $f(x)=6x-18$, name the y -intercept and x -intercept.

ANSWER _____

- 6** Expand $f(x)=3(x+9)$. Then name the y -intercept.

ANSWER _____

APPLY IT Show your work

- 1** A gaming club spends \$30 on prize supplies and earns \$6 for each tournament entry. Its profit is $P(x)=6x-30$, where x is the number of entries. Write $P(x)$ in factored form. Explain what the factored form reveals about when the club breaks even.

WORK SPACE

ANSWER _____

- 2** A phone battery starts at 64% and loses 8 percentage points each hour. Its battery level is $B(h)=-8h+64$, where h is hours. Write $B(h)$ in factored form. Explain what each form reveals.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A nonhorizontal linear function passes through $(4,18)$ and $(10,0)$. Write $f(x)$ in slope-intercept form and in factored form. Explain which property each form reveals.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Write $f(x)=2x+8$ in factored form. Then name the x-intercept.	$f(x)=2(x+4)$; x-intercept = -4
2	Write $f(x)=-3x+12$ in factored form. Then name the x-intercept.	$f(x)=-3(x-4)$; x-intercept = 4
3	Expand $f(x)=4(x+2)$. Then name the slope and y-intercept.	$f(x)=4x+8$; slope = 4, y-intercept = 8
4	For $f(x)=-2(x-6)$, name the slope and x-intercept.	slope = -2, x-intercept = 6
5	For $f(x)=6x-18$, name the y-intercept and x-intercept.	y-intercept = -18, x-intercept = 3
6	Expand $f(x)=3(x+9)$. Then name the y-intercept.	$f(x)=3x+27$; y-intercept = 27

PART 2 • APPLY IT

- $P(x)=6(x-5)$. The club breaks even when $x=5$, so it needs 5 entries to have a profit of \$0.** Factor out 6 to get $6(x-5)$. Set $x-5$ equal to 0 to find the break-even number of entries.
- $B(h)=-8(h-8)$. The form $-8h+64$ shows a starting level of 64% and a drop of 8 percentage points per hour. The form $-8(h-8)$ shows that the battery reaches 0% after 8 hours.** Factor out -8 from $-8h+64$. The factor $h-8$ equals 0 when $h=8$.

CHALLENGE

$f(x)=-3x+30$ and $f(x)=-3(x-10)$. The slope-intercept form shows slope -3 and y-intercept 30. The factored form shows slope -3 and x-intercept 10.

Accept any algebraically equivalent form that correctly preserves the function. For contextual items, accept correct interpretations with appropriate units, including \$0 profit for break-even.