

High School Exit Program

Lesson 62 [47]

EXERCISE 1 STRAIGHT LINE EQUATION

Textbook practice

- a. You've learned about slope.
- What's the letter fraction that tells the slope of a line?
(Signal.) *Y over X.*
 - If the slope is $\frac{5}{8}$, what's the number for Y?
(Signal.) *5.*
 - What's the number for X? (Signal.) *8.*
- (Repeat step a until firm.)
- b. Open your textbook to lesson 62 and find part 1. ✓
- You're going to tell me the slope for each equation.
- c. Read equation A. (Signal.) *Y = 4 thirds X.*
- What's the slope? (Signal.) *4/3.*
 - When Y changes 4 units, how many units does X change? (Signal.) *3.*
- d. Read equation B. (Signal.) *Y = 3 fifths X.*
- What's the slope? (Signal.) *3/5.*

- When Y changes 3 units, how many units does X change? (Signal.) 5.
- e. Read equation C. (Signal.) $Y = 2X$.
- What's the slope? (Signal.) 2.
- Yes, 2 is 2 over 1. When Y changes 2 units, how many units does X change? (Signal.) 1.
- f. Read equation D. (Signal.) $Y = \frac{1}{9}X$.
- What's the slope? (Signal.) $\frac{1}{9}$.
- When Y changes 1 units, how many units does X change? (Signal.) 9.

Textbook practice

- a. Find part 2.
- b. The equation in the box is: $6Y = 5X$. It doesn't tell what Y equals.
 - To find the slope, you solve this equation for Y:
 $Y = \frac{5}{6}X$.
 - What does Y equal? (Signal.) $\frac{5}{6}X$.
 - So what's the slope? (Signal.) $\frac{5}{6}$.
- c. Look at problem A: $\frac{2}{3}Y = 6X$.
 - Does that equation tell the slope? (Signal.) No.
 - To find the slope, what do you solve for? (Signal.) Y.

- Copy the equation and solve for Y. Simplify your answer. Pencils down when you're finished.
(Observe students and give feedback.)
 - Everybody, read the equation for Y. (Signal.) $Y = 9X$.
 - What's the slope? (Signal.) 9.
 - So when Y changes 9 units, how many units does X change? (Signal.) 1.
- d. Work the rest of the problems in part 2. Solve for Y.
Show the slope as a whole number or a simplified fraction. Pencils down when you're finished.
(Observe students and give feedback.)
- e. Check your work.
- Problem B. Read the equation for Y.
(Signal.) $Y = 5 \text{ halves } X$.
What's the slope? (Signal.) $5/2$.
 - Problem C. Read the equation for Y.
(Signal.) $Y = 2 \text{ thirds } X$.
What's the slope? (Signal.) $2/3$.
 - Problem D. Read the equation for Y.
(Signal.) $Y = 4X$.
 - What's the slope? (Signal.) 4.

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EXERCISE 2 SOLVE FOR RATE

Textbook practice

- a. Find part 3. $\sqrt{\quad}$
- b. Question A: How many plants per year did the nursery grow?
- The question asks about **plants per year**.
 - Say the letter fraction for that unit. (Signal.) *P over Y*.
 - Write **P over Y equals**. Then write the simple equation. (Observe students and give feedback.)
 - Everybody, read the simple equation.
(Signal.) $P/Y = P/Y$.
- c. Question B: How many windows per room were there in the hotel?
- What unit does the equation ask about?
(Signal.) *Windows per room*.
 - Say the letter fraction for windows per room.
(Signal.) *W over R*.

- Write the simple letter equation for question B. \checkmark
- Read the equation for question B.

(Signal.) $W/R = W/R$.

d. Question C: How many apples per tree were there?

- What unit does the question ask about?

(Signal.) *Apples per tree*.

- What unit does the question ask about?
- Say the letter fraction. (Signal.)
- Write the simple equation for C. \checkmark
- Read the equation for question C.

(Signal.) $A/T = A/T$.

e. Question D: How many seconds per question did the student need on the test?

- What unit does the question ask about?

(Signal.) *Seconds per question*.

- Write the simple equation for question D. \checkmark
- Read the equation for question D.

(Signal.) $S/Q = S/Q$.

f. Question E: If the plane travels 1000 kilometers, how many kilometers per hour does the plane travel?

- What unit does the question ask about?

(Signal.) *Kilometers per hour.*

- Write the simple equation for question E. \checkmark
- Read the equation for question E.

(Signal.) $K/H = K/H$.

Textbook practice

a. Find part 4. \checkmark

- (Teacher reference:)

$\frac{w}{r} = \frac{w}{r}$	
$\frac{w}{r} = \frac{840}{280}$	
$\frac{w}{r} = 3$	
<table border="1"><tr><td>3 windows per room</td></tr></table>	3 windows per room
3 windows per room	

b. The box shows how you work problems that ask about the rate. The problem is: There are 840 windows in 280 rooms of the hotel. How many windows per room are there?

- The question asks: How many windows per room are there?

- What's the unit that answers the question? (Signal.)

Windows per room.

- You can see the simple equation: $W/R = W/R$.
 - To figure out W over R, you put the numbers the problem gives in the second fraction.
 - Where do you put the numbers? (Signal.) *In the second fraction.*
 - You can see the equation with numbers for W and R.
 - Everybody, read the equation. (Signal.)
 $W/R = 840/280$.
 - Next, you simplify the fraction. It simplifies to 3.
 - What's the unit name? (Signal.) *Windows per room.*
Yes, the unit name is windows per room. So the answer you box is: 3 windows per room.
- c. Problem A: A snail was observed for 3 hours. The snail traveled 57 inches in that time. How many inches per hour did the snail travel?
- What unit answers that question? (Signal.) *Inches per hour.*
 - What's the letter fraction? (Signal.) I/H .
 - What's the simple equation? (Signal.) $I/H = I/H$.

- Write the simple equation and put the numbers the problem gives in the second fraction. Then figure out the answer and write it with the full unit name. Pencils down when you're finished.

(Observe students and give feedback.)

- (Write on the board:)

a. $\frac{i}{h} = \frac{i}{h}$
 $\frac{i}{h} = \frac{57}{3}$

19 inches per hour

- Here's what you should have.
 - The equation with letters is: $I/H = I/H$.
 - Say the equation with numbers. (Signal.)
 $I/H = 57/3$.
 - What's the full answer? (Signal.) *19 inches per hour.*
- d. Problem B: A construction company received 8 loads of materials. The company was able to complete 12 jobs with those loads. How many jobs per load was the company able to complete?

- What unit answers the question? (Signal.) *Jobs per load.*
- What's the letter fraction? (Signal.) *J over L.*
- What's the simple equation? (Signal.) $J/L = J/L.$
- Write the simple equation and put the numbers the problem gives in the second fraction. Then figure out the answer and write it with the full unit name. Pencils down when you're finished.

(Observe students and give feedback.)

- (Write on the board:)

b. $\frac{j}{l} = \frac{j}{l}$
 $\frac{j}{l} = \frac{12}{8}$

$1 \frac{1}{2}$ jobs

- Here's what you should have.
- What's the full answer? (Signal.) *1 and 1/2 jobs per load.*

e. Problem C: A computer processes 57,000 bits in 30 milliseconds. How many bits per millisecond does the computer process?

- Write the simple equation with letters and work the problem. Pencils down when you're finished.

(Observe students and give feedback.)

- Check your work.
- Everybody, read the simple equation with letters.

(Signal.) $B/M = B/M$.

- Read the equation with numbers. (Signal.)

$B/M = 57000/30$.

- What's the answer? (Signal.) *1900 bits per millisecond.*

f. Problem D: It takes a train 4.2 hours to go 210 miles. On average, how many miles per hour does the train travel?

- Write the simple equation with letters and work the problem. Pencils down when you're finished.

(Observe students and give feedback.)

- Check your work.

- Everybody, read the simple equation with letters.

(Signal.) $M/H = M/H$.

- Read the equation with numbers. (Signal.)

$M/H = 210/4.2$.

- What's the answer? (Signal.) *50 miles per hour.*

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EXERCISE 3 DISTRIBUTION

Textbook practice

- a. Find part 5. $\sqrt{\quad}$
- To work these problems, you distribute the value outside the parentheses. For some problems, that value is on the right side of the parentheses.
- b. Copy problem A and work it. Pencils down when you're finished.

(Observe students and give feedback.)

- (Write on the board:)

$$\begin{aligned} \text{a.} \quad 1 &= (4a - 10) \frac{1}{2} \\ 1 &= 4a \cdot \frac{1}{2} - 10 \cdot \frac{1}{2} \\ 1 &= 2a - 5 \\ \frac{+5}{+5} \quad \frac{+5}{+5} & \\ \left(\frac{1}{2}\right) 6 &= 2a \left(\frac{1}{2}\right) \\ \boxed{3 = a} & \end{aligned}$$

- Here's what you should have.
 - Read the equation you start with. (Signal.)
 $1 = \text{the quantity } 4A - 10 \times 1/2.$
 - Read the equation you get when you distribute $1/2$.
(Signal.) $1 = 4A \times 1/2 - 10 \times 1/2.$
 - Read the equation you get when you multiply.
(Signal.) $1 = 2A - 5.$
 - What does A equal? (Signal.) 3.
- c. Work problem B. Remember to use your rules for multiplying signed numbers. Pencils down when you're finished.
- (Observe students and give feedback.)
- (Write on the board:)

$$\begin{array}{r}
 \mathbf{b.} \quad (-2 + g) 5 = 25 \\
 -2 \cdot 5 + g \cdot 5 = 25 \\
 -10 + 5g = 25 \\
 +10 \quad +10 \\
 \hline
 \left(\frac{1}{5}\right) 5g = 35 \left(\frac{1}{5}\right) \\
 \boxed{g = 7}
 \end{array}$$

- Here's what you should have.

- Read the equation you start with. (Signal.)
The quantity $- 2 + G \times 5 = 25$.
- Read the equation you get when you distribute.
(Signal.) $- 2 \times 5 + G \times 5 = 25$.
- Read the equation you get after you multiply.
(Signal.) $- 10 + 5G = 25$.
- What does G equal? (Signal.) 7.

d. Work the rest of the problems in part 5.

Remember to follow the rules for multiplying signed numbers. Pencils down when you're finished.

(Observe students and give feedback.)

e. Check your work.

f. Everybody, read problem C. (Signal.)

42 = the quantity $2Q - 5, \times 6$.

- Read the equation you get when you distribute.
(Signal.) $42 = 2Q \times 6 - 5 \times 6$.
- Read the equation you get after you multiply.
(Signal.) $42 = 12Q - 30$.
- What does Q equal? (Signal.) 6.

g. Everybody, read problem D. (Signal.)

20 = 4 x the quantity $- 9 + 2R$.

- Read the equation you get when you distribute.
(Signal.) $20 = 4x - 9 + 4 \times 2R$.
 - Read the equation you get after you multiply.
(Signal.) $20 = -36 + 8R$.
 - What does R equal? (Signal.) 7.
- h. Everybody, read problem E. (Signal.)
- 3 x the quantity 5M + 3 x 7 = 6.*
- Read the equation you get when you distribute.
(Signal.) $3 \times 5M + 3 \times 7 = 6$.
 - Read the equation you get after you multiply.
(Signal.) $15M + 21 = 6$.
 - What does M equal? (Signal.) -1.

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EXERCISE 4 ALGEBRA TRANSLATION

Percent

- a. You can write equations for sentences that tell about percents. For percents, you write a hundredths fraction: 65 percent is the fraction 65 hundredths.
- b. What's the fraction for 82 percent? (Signal.) *82 hundredths.*
- What's the fraction for 6 percent? (Signal.) *6 hundredths.*
 - What's the fraction for 123 percent? (Signal.) *123 hundredths.*
 - What's the fraction for 345 percent? (Signal.) *345 hundredths.*
- (Repeat step b until firm.)

Textbook practice

a. Find part 6. $\sqrt{\quad}$

- (Teacher reference:)

- 75% of the boys were working.

$$\frac{75}{100} b = w$$

- 82% of the cars were dirty.

d. The box shows a sentence with a percent:

75% of the boys were working.

- So the equation is: 75 hundredths $B = W$.

e. Below, is another sentence of the same type:

82 percent of the cars were dirty.

- Write the equation for that sentence. Pencils down when you're finished.

(Observe students and give feedback.)

- Everybody, read the equation. (Signal.)

82 hundredths $C = D$.

- (Teacher reference:)

- The cost of the radio was 145% the cost of the calculator.

$$r = \frac{145}{100} c$$

f. The next box shows a different kind of sentence:

The cost of the radio was 145% the cost of the calculator.

- The equation is shown below. Everybody, read the equation. (Signal.) $R = 145 \text{ hundredths } C$.

Yes. $R = 4/100 C$.

g. Look at sentence A: His savings was 30% of his earnings.

- Write the equation. Pencils down when you're finished. (Observe students and give feedback.)
- (Write on the board:)

$$\mathbf{a.} \quad s = \frac{30}{100} c$$

- Here's what you should have: $S = 30 \text{ hundredths } E$.

h. Sentence B: Tom's age was 140% of his sister's age.

- Write the equation. Pencils down when you're finished. (Observe students and give feedback.)
- (Write on the board:)

$$\mathbf{b.} \quad T = \frac{140}{100} s$$

- Here's what you should have: $T = 140$ hundredths S .
- i. Sentence C: 80% of the sheep were in the barn.
- Write the equation. Pencils down when you're finished. ✓
- (Write on the board:)

$$\mathbf{c.} \quad \frac{80}{100} s = b$$

- Here's what you should have: 80 hundredths $S = B$.
- j. Sentence D: 6% of his earnings went to charity.
- Write the equation. Pencils down when you're finished. ✓
- (Write on the board:)

$$\mathbf{d.} \quad \frac{6}{100} e = c$$

- Here's what you should have: 6 hundredths $E = C$.

Textbook practice

- a. Find part 7. ✓
- b. Problem A: Al's height is 120% of his dad's height.
Al is 78 inches tall. How tall is his dad?

- Write the equation with letters and then figure out the answer. Remember, you can simplify 120/100.

Pencils down when you're finished.

(Observe students and give feedback.)

- (Write on the board:)

a.

$$A = \frac{120}{100} d \quad \boxed{A = 78}$$

$$\left(\frac{100}{120}\right) 78 = \frac{120}{100} d \left(\frac{100}{120}\right)$$

$$65 = d$$

$\boxed{65 \text{ inches}}$

- Here's what you should have.
- $A = 120$ hundredths D . A is 78.
So his dad is 65 inches tall.
- c. Your turn: Work the rest of the problems in part 7.
Pencils down when you're finished.
(Observe students and give feedback.)
- d. Check your work.

- (Write on the board:)

b. $d = \frac{25}{100} m$ $m = 16$

$d = \frac{25}{100} (16)$

$d = 4$

$\$4$

c. $\frac{55}{100} d = 22$ $f = 22$

$\left(\frac{100}{55}\right) \frac{55}{100} d = f \left(\frac{100}{55}\right)$

$d = 40$

40 dogs

- Here's what you should have for problems B and C.

e. Problem B: The cost of the dessert is 25% the cost of the main course. The main course is \$16.

- Everybody, what's the cost of the dessert?

(Signal.) \$4.

f. Problem C: 55% of the dogs have been fed. 22 dogs have been fed.

- Everybody, how many dogs are there?

(Signal.) 40.

Yes, 40 dogs in all.

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EXERCISE 5 EXPONENTS

Textbook practice

- a. Find part 8. $\sqrt{\quad}$
- Copy each fraction and complete the equation with a fraction that has only positive exponents. Pencils down when you're finished.
(Observe students and give feedback.)
- b. Check your work.
- c. Fraction A: M^4 over 5^{-3} times 6^2 .
- (Call on a student.) Read the fraction with positive exponents. (Idea: M^4 times 5^3 over 6^2 .)
- d. Fraction B: 4^{-5} times V^{-4} over 6^7 .
- (Call on a student.) Read the fraction with positive exponents. (Idea: 1 over 6^7 times 4^5 times V^4 .)

- e. Fraction C: R^{-8} times 9^2 over L^{-4} times M^5 .
- (Call on a student.) Read the fraction with positive exponents. (Idea: 9^2 times L^4 over M^5 times R^8 .)
- f. Fraction D: 5^{-4} times Q^{-1} over 7^{-2} .
- (Call on a student.) Read the fraction with positive exponents. (Idea: 7^2 over 5^4 times Q^1 .)

EXERCISE 6 INDEPENDENT WORK

Assign Independent Work, textbook parts 9–15