

Teacher Notes.

Lesson 24: True and False Number Sentences

Classwork

Opening Exercise

State whether each number sentence is true or false. If the number sentence is false, explain why.

a. $4 + 5 > 9$
 $9 > 9$ False. 9 is not greater than 9

b. $3 \cdot 6 = 18$
 $18 = 18$ True

c. $32 > \frac{64}{4}$
 $32 > 16$ True

Handwritten work:
 $4 \overline{) 16}$
 $4 \cdot 4 = 16$
 $16 - 16 = 0$

d. $78 - 15 < 68$
 $63 < 68$ True

e. $22 \geq 11 + 12$
 $22 \geq 23$ False. 22 is not greater than or equal to 23.

Example 1

Write true or false if the number substituted for g results in a true or false number sentence.

Substitute g with	$4g = 32$	$g = 8$	$3g \geq 30$	$g \geq 10$	$\frac{g}{2} > 2$	$g > 4$	$30 \geq 38 - g$	$g \geq 8$
8	$4(8) = 32$ True	$8 = 8$ True	$3(8) = 24 \geq 30$ False	$8 \geq 10$ False	$\frac{8}{2} > 2 = 4 > 2$ True	$8 > 4$ True	$30 \geq 38 - 8$ True	$8 \geq 8$ True
4	$4(4) = 16$ False	$4 = 8$ False	$3(4) = 12 \geq 30$ False	$4 \geq 10$ False	$\frac{4}{2} > 2 = 2 > 2$ False	$4 > 4$ False	$30 \geq 38 - 4$ False	$4 \geq 8$ False
2	$2(2) = 10$ False	$2 = 8$ False	$3(2) \geq 30$ False	$2 \geq 10$ False	$\frac{2}{2} > 2 = 1 > 2$ False	$2 > 4$ False	$30 \geq 38 - 2$ False	$2 \geq 8$ False
0	$4(0) = 0$ False	$0 = 8$ False	$3(0) = 0 \geq 30$ False	$0 \geq 10$ False	$\frac{0}{2} > 2$ False	$0 > 4$ False	$30 \geq 38 - 0$ False	$0 \geq 8$ False
10	$4(10) = 40$ False	$10 = 8$ False	$3(10) \geq 30$ True	$10 \geq 10$ True	$\frac{10}{2} > 2 = 5 > 2$ True	$10 > 4$ True	$30 \geq 38 - 10$ True	$10 \geq 8$ True

Example 2

State when the following equations/inequalities will be true and when they will be false.

a. $r + 15 = 25$ $v = 10$

$10 + 15 = 25$

$9 + 15 = 25$ $v = 9$

$24 = 25$ False.

Any number other than 10 will not work.

b. $6 - d > 0$

$6 - 4 > 0$

$2 > 0$

d has to be between 1 and 5.

c. $\frac{1}{2}f = 15$

$\frac{1}{2}(30) = 15$

The equation is true when the value substituted for f is 30 ($f = 30$) $\hat{=}$ false when the value is any other number.

d. $\frac{y}{3} < 10$

$\frac{30}{3} < 10$

y has to be any value less than 30 to be true $\hat{=}$ false when the value of y is greater than 30.

e. $7g \geq 42$

$7(6) \geq 42$

$42 \geq 42$

The inequality is true for any value of g that is greater than or equal to 6. ($g \geq 6$) $\hat{=}$ false when the value of g is less than ($g < 6$)

f. $a - 8 \leq 15$

The inequality is true for any value of a that is less than or equal to 23. ($a \leq 23$) and false when the value of a is greater than 23. $a > 23$.

Exercises

Complete the following problems in pairs. State when the following equations and inequalities will be true and when they will be false.

1. $15c > 45$

$15(3) > 45$

$45 > 45$

c must be greater than 3 to be true!

$$2. \quad 25 = d - 10$$

$$25 = 35 - 10$$

$$25 = 25$$

$$d = 35$$

$$3. \quad 56 \geq 2e$$

$$56 \geq 2(28)$$

$$56 \geq 56$$

e must be $=$ or less than 28 .

$$4. \quad \frac{h}{5} \geq 12$$

$$\frac{60}{5} \geq 12$$

h must be greater than or equal to 60 .
 $h \geq 60$

$$5. \quad 45 > h + 29$$

$$45 > 16 + 29$$

h must be less than 16 ($h < 16$).

$$6. \quad 4a \leq 16$$

$$4(4) \leq 16$$

The inequality is true for any value of a that is less than or equal to 4 . ($a \leq 4$)

$$7. \quad 3x = 24$$

$$3(8) = 24$$

The equation is true when the value of $x = 8$.

Identify all equality and inequality signs that can be placed into the blank to make a true number sentence.

$$8. \quad 15 + 9 \underline{=} 24 \quad \text{or} \quad \geq \quad \text{or} \quad \leq$$

$$9. \quad 8 \cdot 7 \underline{>} 50 \quad \text{or} \quad \geq$$

10. $\frac{15}{2}$ _____ 10 < or \leq

11. 34 _____ $17 \cdot 2$ or \geq or \leq

12. 18 _____ $24.5 - 6$ < or \leq