

# St James Math Packet

Students entering 8<sup>th</sup> grade (Red Group)

Summer Skills Sharpener

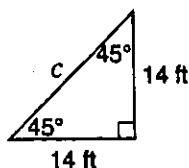
In an effort to spend less time reviewing in the beginning of the school year, this Math packet must be completed during summer vacation. It will be collected during the first week of school, and will be counted as one test grade for the First Quarter.

# 2-10 Special Right Triangles

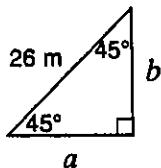
Name \_\_\_\_\_ Date \_\_\_\_\_

## 45°-45°-90° triangle (Isosceles Right Triangle)

$$\begin{aligned} \text{hypotenuse} &= \sqrt{2} \cdot \text{leg} \\ &= \sqrt{2} \cdot 14 \\ c &= 14\sqrt{2} \text{ ft} \end{aligned}$$



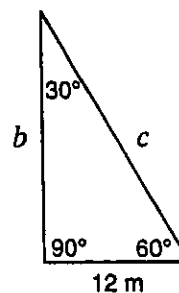
$$\begin{aligned} \text{leg} &= \frac{\sqrt{2}}{2} \cdot \text{hypotenuse} \\ &= \frac{\sqrt{2}}{2} \cdot 26 \\ a = b &= 13\sqrt{2} \text{ m} \end{aligned}$$



## 30°-60°-90° triangle

$$\begin{aligned} \text{shorter leg} &= \frac{1}{2} \cdot \text{hypotenuse} \\ 12 &= \frac{1}{2} \cdot c \\ 24 \text{ m} &= c \end{aligned}$$

$$\begin{aligned} \text{longer leg} &= \frac{\sqrt{3}}{2} \cdot \text{hypotenuse} \\ &= \frac{\sqrt{3}}{2} \cdot 24 \\ b &= 12\sqrt{3} \text{ m} \end{aligned}$$



Find the exact length of the missing side of each 45°-45°-90° triangle.  
Each leg has a length of  $a$  and the hypotenuse has a length of  $c$ .

1.  $a = 8 \text{ mm}, c = ? \text{ mm}$

$c = a\sqrt{2} \rightarrow c = 8\sqrt{2} \text{ mm}$

2.  $a = 9 \text{ m}, c = ? \text{ m}$

\_\_\_\_\_

3.  $a = 27 \text{ km}, c = ? \text{ km}$

\_\_\_\_\_

4.  $a = 3 \text{ cm}, c = ? \text{ cm}$

\_\_\_\_\_

5.  $a = 39 \text{ in.}, c = ? \text{ in.}$

\_\_\_\_\_

6.  $a = ? \text{ cm}, c = 14 \text{ cm}$

\_\_\_\_\_

7.  $a = ? \text{ ft}, c = 4 \text{ ft}$

\_\_\_\_\_

8.  $a = ? \text{ ft}, c = 48 \text{ ft}$

\_\_\_\_\_

9.  $a = ? \text{ m}, c = 17 \text{ m}$

\_\_\_\_\_

10.  $a = ? \text{ in.}, c = 24 \text{ in.}$

\_\_\_\_\_

11.  $a = ? \text{ yd}, c = 120 \text{ yd}$

\_\_\_\_\_

12.  $a = ? \text{ in.}, c = 11 \text{ in.}$

\_\_\_\_\_

13.  $a = ? \text{ mm}, c = 7 \text{ mm}$

\_\_\_\_\_

14.  $a = ? \text{ ft}, c = 85 \text{ ft}$

\_\_\_\_\_

15.  $a = ? \text{ m}, c = 13 \text{ m}$

\_\_\_\_\_

16.  $a = ? \text{ yd}, c = 9\sqrt{2} \text{ yd}$

\_\_\_\_\_

17.  $a = ? \text{ cm}, c = 60\sqrt{2} \text{ cm}$

\_\_\_\_\_

18.  $a = 3\sqrt{2} \text{ dm}, c = ? \text{ dm}$

\_\_\_\_\_

19.  $a = 14\sqrt{2} \text{ in.}, c = ? \text{ in.}$

\_\_\_\_\_

20.  $a = ? \text{ ft}, c = 58\sqrt{2} \text{ ft}$

\_\_\_\_\_

21.  $a = 175\sqrt{2} \text{ m}, c = ? \text{ m}$

\_\_\_\_\_



Find the exact length of the missing side of each 30°-60°-90° triangle. The length of the shorter leg is  $a$ , the length of the longer leg is  $b$ , and the length of the hypotenuse is  $c$ .

22.  $a = ?$  m,  $b = ?$  m,  $c = 12$  m    23.  $a = ?$  yd,  $b = ?$  yd,  $c = 18$  yd    24.  $a = ?$  km,  $b = ?$  km,  $c = 19$  km

$a = \frac{1}{2} \cdot 12 = 6$ ;  $b = \frac{\sqrt{3}}{2} \cdot 12 = 6\sqrt{3}$

$a = 6$  m;  $b = 6\sqrt{3}$  m

25.  $a = ?$  ft,  $b = ?$  ft,  $c = 85$  ft    26.  $a = 2$  m,  $b = ?$  m,  $c = ?$  m    27.  $a = 6$  in.,  $b = ?$  in.,  $c = ?$  in.

28.  $a = 7$  cm,  $b = ?$  cm,  $c = ?$  cm    29.  $a = 13$  cm,  $b = ?$  cm,  $c = ?$  cm    30.  $a = ?$  mm,  $b = 7\sqrt{3}$  mm,  $c = ?$  mm

31.  $a = ?$  mm,  $b = 23\sqrt{3}$  mm,  $c = ?$  mm    32.  $a = ?$  mi,  $b = 41\sqrt{3}$  mi,  $c = ?$  mi    33.  $a = ?$  in.,  $b = 72\sqrt{3}$  in.,  $c = ?$  in.

**Real-World**

34. The diagonal of a square is  $46\sqrt{2}$  feet long. What is the length of the side of the square?
35. Mr. Brown's square yard has an area of 625 square feet. Mr. Brown wants to put a fence around two sides of the yard and along its diagonal. To the nearest tenth, what is the perimeter of the fenced in part of the yard?
36. A 60-foot ladder makes a 30-degree angle where it meets the top of a tree. How far is the tree base from the base of the ladder?
37. A bus travels 7 miles north and then 7 miles west before it arrives at its first stop. To the nearest tenth, how many miles is the bus from its starting point?

**SPIRAL REVIEW**

Simplify.

38.  $-\sqrt{36}$     39.  $\sqrt{144}$     40.  $\sqrt{169}$     41.  $12^2 + 5^2$     42.  $1.1^2 + 0.3^2$     43.  $0.4^2 + 0.9^2$



Write each word phrase as an algebraic expression.

13. 15 decreased by  $z$

$$\underline{15 - z}$$

14. the sum of  $a$  and  $b$

$$\underline{\hspace{2cm}}$$

15. the sum of 4 and  $y$

$$\underline{\hspace{2cm}}$$

16. 10 less than  $c$

$$\underline{\hspace{2cm}}$$

17. 12 more than  $d$

$$\underline{\hspace{2cm}}$$

18. twice as many children,  $c$

$$\underline{\hspace{2cm}}$$

19. 10 times a weight,  $w$

$$\underline{\hspace{2cm}}$$

20. two-thirds of  $k$

$$\underline{\hspace{2cm}}$$

21.  $j$  divided by 6

$$\underline{\hspace{2cm}}$$

22. the quotient of  $m$  increased by  $p$ , and 3

$$\underline{\hspace{2cm}}$$

23. a number,  $g$ , divided by 3, increased by 2

$$\underline{\hspace{2cm}}$$

24. the quotient of twice a number,  $t$ , and 7

$$\underline{\hspace{2cm}}$$

25. 7 more than twice a number,  $b$

$$\underline{\hspace{2cm}}$$

26. three times the sum of  $p$  and  $q$

$$\underline{\hspace{2cm}}$$

27. the product of 12 and the sum of 10 and  $x$

$$\underline{\hspace{2cm}}$$

28. twice the width,  $w$ , added to twice the length,  $\ell$

$$\underline{\hspace{2cm}}$$

29. the quotient of  $a$  and  $b$ , multiplied by 2

$$\underline{\hspace{2cm}}$$

30. two fifths of the difference of a number,  $h$ , and 3

$$\underline{\hspace{2cm}}$$

Solve. Write your answer as an algebraic expression.

31. On opening night, seven eighths of the people who attended a concert stayed for the encore. If  $p$  people attended the concert, how many people stayed for the encore?

$$\underline{\hspace{2cm}}$$

32. At Smith High School, twenty more than twice as many students graduated this year as had graduated last year. If  $s$  students graduated last year, how many students graduated this year?

$$\underline{\hspace{2cm}}$$

### WRITE ABOUT IT

33. Reed translated the phrase "7 plus 3 times  $n$ " as  $7 + 3n$ . Ricki wrote  $(7 + 3)n$ . Which student do you think is correct? How do their answers differ? Explain your answer.

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

## Literal Equations

Solve each equation for the indicated variable.

1)  $g = 6x$ , for  $x$

2)  $u = 2x - 2$ , for  $x$

3)  $z = m - x$ , for  $x$

4)  $g = ca$ , for  $a$

5)  $u = x - k$ , for  $x$

6)  $g = c + x$ , for  $x$

7)  $u = \frac{k}{a}$ , for  $a$

8)  $g = xc$ , for  $x$

9)  $12am = 4$ , for  $a$

10)  $-3x + 2c = -3$ , for  $x$

11)  $am = n + p$ , for  $a$

12)  $u = \frac{ak}{b}$ , for  $a$

13)  $a - c = d - r$ , for  $a$

14)  $xm = np$ , for  $x$

# Fractions/Decimals Worksheet

Write the following fractions as decimals.

1 a.  $\frac{18}{50} =$

1 b.  $\frac{69}{100} =$

2 a.  $\frac{1}{5} =$

2 b.  $\frac{4}{10} =$

3 a.  $\frac{57}{100} =$

3 b.  $\frac{1}{2} =$

4 a.  $\frac{1}{10} =$

4 b.  $\frac{5}{100} =$

5 a.  $\frac{96}{100} =$

5 b.  $\frac{8}{10} =$

6 a.  $\frac{1}{100} =$

6 b.  $\frac{23}{100} =$

7 a.  $\frac{99}{100} =$

7 b.  $\frac{6}{10} =$

8 a.  $\frac{6}{20} =$

8 b.  $\frac{11}{25} =$

9 a.  $\frac{51}{100} =$

9 b.  $\frac{58}{100} =$

# Solving Multi-Step Equations

## Variables on Both Sides - Negative Coefficients

Name: \_\_\_\_\_ Date: \_\_\_\_\_



Solve the equations.

(1)  $-5x - 140 = 132 + 3x$

(2)  $-118 - 2x = 5x + 64$

(3)  $15x - 90 = 6x + 108$

(4)  $5x - 104 = 113 - 2x$

(5)  $-11 - 10x = -11x + 16$

(6)  $14x - 194 = 106 - x$

(7)  $-14x - 166 = 56 - 8x$

(8)  $-121 - 2x = -8x + 59$

(9)  $-3x - 48 = -8x + 102$

(10)  $-48 - 11x = 14 - 13x$

(11)  $-8x - 37 = -12x + 71$

(12)  $-79 + 6x = 169 + 14x$

**Inequalities Word Problem Worksheet**

**Establish a variable, write an inequality to represent the scenerio, and solve. Write a complete sentence to describe your solution.**

- 1) Keith has \$500 in a savings account at the beginning of the summer. He wants to have at least \$200 at the end of the summer. He withdraws \$25 per week for food, clothing, and movie tickets. How many weeks can Keith withdraw money from his account?
  
  
  
  
  
  
  
  
  
  
- 2) A taxi charges a flat rate of \$1.75, plus an additional \$0.65 per mile. If Erica has at most \$10 to spend on the cab ride, how far could she travel?
  
  
  
  
  
  
  
  
  
  
- 3) Chris wants to order DVD's over the internet. Each DVD costs \$15.99 and shipping the entire order costs \$9.99. If he can spend no more than \$100, how many DVD's could he buy?
  
  
  
  
  
  
  
  
  
  
- 4) Allison practices her violin for at least 12 hours per week. She practices for three fourths of an hour each session. If Allison has already practiced 3 hours this week, how many more sessions remain for her to meet or exceed her weekly practice goal?
  
  
  
  
  
  
  
  
  
  
- 5) Pet Supplies makes a profit of \$5.50 per bag on its line of natural dog food. If the store wants to make a profit of no less than \$5225, how many bags of dog food does it need to sell?



NAME \_\_\_\_\_

SHARPEN  
YOUR  
SKILLS

## Adding and Subtracting Integers

Add or subtract.

1.  $-4 - (4)$  \_\_\_\_\_

2.  $-7 + 9$  \_\_\_\_\_

3.  $-9 - (-9)$  \_\_\_\_\_

4.  $-25 - (-5)$  \_\_\_\_\_

5.  $0 + (-8)$  \_\_\_\_\_

6.  $-8 - (-12)$  \_\_\_\_\_

7.  $-9 + 22$  \_\_\_\_\_

8.  $-17 - 20$  \_\_\_\_\_

9.  $15 - 42$  \_\_\_\_\_

10.  $-12 + (-2)$  \_\_\_\_\_

11.  $67 - (-66)$  \_\_\_\_\_

12.  $13 + (-7)$  \_\_\_\_\_

13.  $6 - 26$  \_\_\_\_\_

14.  $-22 - 15$  \_\_\_\_\_

15.  $-32 - (-36)$  \_\_\_\_\_

16.  $14 + (-20)$  \_\_\_\_\_

17.  $8 - (-7)$  \_\_\_\_\_

18.  $8 + (-3)$  \_\_\_\_\_

19.  $-9 + 9 =$  \_\_\_\_\_

20.  $37 - 22$  \_\_\_\_\_

21.  $-15 + 8$  \_\_\_\_\_

22.  $17 + (-7)$  \_\_\_\_\_

23.  $-12 + 8$  \_\_\_\_\_

24.  $-36 - (-9)$  \_\_\_\_\_

25.  $9 - (-4)$  \_\_\_\_\_

26.  $-9 + (-9)$  \_\_\_\_\_

27.  $16 + (-2)$  \_\_\_\_\_

28.  $24 - (-10)$  \_\_\_\_\_

29.  $-32 + 27$  \_\_\_\_\_

30.  $16 + (-32)$  \_\_\_\_\_

31.  $-10 + 28 + (-7)$  \_\_\_\_\_

32.  $-19 + 21 + 15 + (-5)$  \_\_\_\_\_

33.  $32 - 54 - (-2)$  \_\_\_\_\_

34.  $61 - (-50) + 22$  \_\_\_\_\_

35.  $-4 - 8 - (-12)$  \_\_\_\_\_

36.  $-38 - 21 - (-51)$  \_\_\_\_\_

Complete the tables.

	$a$	$9 + a$
37.	2	
38.	-2	
39.	-3	

	$b$	$12 - b$
40.		7
41.	0	
42.		-4

	$c$	$c + 5$
43.	-4	
44.		16
45.		-12



NAME \_\_\_\_\_


 SHARPEN  
YOUR  
SKILLS

## Solving One-Step Multiplication/ Division Equations

Solve each equation.

1.  $45 = \frac{n}{5}$

\_\_\_\_\_

2.  $2.4x = 1.8$

\_\_\_\_\_

3.  $\frac{1}{3}y = 14$

\_\_\_\_\_

4.  $\frac{18}{5} = \frac{4m}{3}$

\_\_\_\_\_

5.  $\frac{2}{3}n = -18$

\_\_\_\_\_

6.  $40p = 1,520$

\_\_\_\_\_

7.  $5q = -4\frac{2}{3}$

\_\_\_\_\_

8.  $7r = -\frac{7}{8}$

\_\_\_\_\_

9.  $2\frac{5}{7}t = 10$

\_\_\_\_\_

10.  $10x = 24$

\_\_\_\_\_

11.  $1\frac{1}{3}p = 18$

\_\_\_\_\_

12.  $63q = 1,071$

\_\_\_\_\_

**Mixed Practice** Solve each equation.

13.  $k + 7 = 34$

\_\_\_\_\_

14.  $\frac{1}{4} + g = \frac{5}{8}$

\_\_\_\_\_

15.  $x - 81 = 53$

\_\_\_\_\_

16.  $1\frac{1}{2} + t = 4$

\_\_\_\_\_

17.  $3\frac{1}{4}y = 2\frac{1}{2}$

\_\_\_\_\_

18.  $6 = 3\frac{1}{2} + b$

\_\_\_\_\_



Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

**Multiplication of matrices**

Sheet 1

Find the product of the matrices:

$$\begin{bmatrix} 6 & 3 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} 3 & 2 \\ -4 & 8 \end{bmatrix} =$$

$$\begin{bmatrix} -1 & 2 & 1 \\ 8 & -3 & 5 \\ 11 & 2 & 6 \end{bmatrix} \begin{bmatrix} 3 & 2 & -1 \\ 5 & 3 & 2 \\ 6 & 1 & 4 \end{bmatrix} =$$

$$\begin{bmatrix} 2 & 6 & -5 \\ 1 & 3 & 4 \\ -7 & 2 & 10 \end{bmatrix} \begin{bmatrix} 1 & 0 & 11 \\ -5 & 2 & 4 \\ -9 & 7 & 8 \end{bmatrix} =$$

$$\begin{bmatrix} 5 & 3 & 2 \\ 6 & 4 & 1 \\ 7 & -9 & 12 \end{bmatrix} \begin{bmatrix} -2 & 5 & 4 \\ 5 & 6 & 13 \\ 3 & 2 & 1 \end{bmatrix} =$$

$$\begin{bmatrix} 6 & -12 \\ 5 & 11 \end{bmatrix} \begin{bmatrix} 2 & 8 \\ 3 & 1 \end{bmatrix} =$$



Determine if the number is rational (R) or irrational (I).

**Answers**

- |  |  |
|--|--|
| <p>1) <math>61\pi</math></p> <p>2) 42</p> <p>3) <math>75.082\overline{106}</math></p> <p>4) <math>\sqrt{101}</math></p> <p>5) <math>65.4\overline{279}</math></p> <p>6) <math>\frac{20}{6}</math></p> <p>7) <math>\pi</math></p> <p>8) <math>5.62\overline{13}</math></p> <p>9) <math>\frac{98}{16}</math></p> <p>10) 39</p> <p>11) 89.396668...</p> <p>12) <math>\sqrt{17}</math></p> <p>13) 67.714813...</p> <p>14) <math>\sqrt{64}</math></p> <p>15) <math>\frac{1}{4}</math></p> <p>16) <math>\sqrt{25}</math></p> <p>17) <math>71.5\overline{186}</math></p> <p>18) <math>\frac{7}{54}</math></p> <p>19) 20.455566...</p> <p>20) 97.33997</p> | <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p>6. _____</p> <p>7. _____</p> <p>8. _____</p> <p>9. _____</p> <p>10. _____</p> <p>11. _____</p> <p>12. _____</p> <p>13. _____</p> <p>14. _____</p> <p>15. _____</p> <p>16. _____</p> <p>17. _____</p> <p>18. _____</p> <p>19. _____</p> <p>20. _____</p> |
|--|--|

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## Squares and Square Roots (A)

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Instructions: Find the square root or square of each integer.

$$\sqrt{256} = \quad \sqrt{4} = \quad \sqrt{169} = \quad \sqrt{100} =$$

$$\sqrt{121} = \quad \sqrt{196} = \quad \sqrt{16} = \quad \sqrt{64} =$$

$$\sqrt{1} = \quad \sqrt{9} = \quad \sqrt{49} = \quad \sqrt{144} =$$

$$\sqrt{225} = \quad \sqrt{81} = \quad \sqrt{25} = \quad \sqrt{36} =$$

$$11^2 = \quad 13^2 = \quad 14^2 = \quad 10^2 =$$

$$12^2 = \quad 1^2 = \quad 15^2 = \quad 6^2 =$$

$$9^2 = \quad 3^2 = \quad 4^2 = \quad 16^2 =$$

$$8^2 = \quad 7^2 = \quad 5^2 = \quad 2^2 =$$

Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

**Multiplication of matrices**

Sheet 3

Find the product of the following matrices:

$$\text{Let } A = \begin{bmatrix} 9 & 2 & -1 \\ 3 & 4 & 1 \\ 7 & 7 & -8 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 2 & 5 \\ -12 & 1 & 4 \\ 6 & 2 & 9 \end{bmatrix}. \text{ Find } AB.$$

$$\text{Let } A = \begin{bmatrix} 1 & 6 & 5 \\ 4 & 2 & 1 \\ 8 & 2 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 1 & 2 \\ 8 & 4 & 1 \\ 3 & 3 & -2 \end{bmatrix}. \text{ Find } AB.$$

$$\text{Let } A = \begin{bmatrix} 2 & 7 \\ -5 & 4 \end{bmatrix} \text{ and } B = \begin{bmatrix} 6 & 3 \\ 4 & -9 \end{bmatrix}. \text{ Find } AB.$$

$$\text{Let } A = \begin{bmatrix} -1 & 3 & 5 \\ 8 & 2 & 3 \\ 6 & 4 & -2 \end{bmatrix} \text{ and } B = \begin{bmatrix} 3 & 4 & 5 \\ 6 & 2 & 1 \\ -8 & 5 & 2 \end{bmatrix}. \text{ Find } AB.$$



**Evaluate the Expressions: Multi-variables**

Easy: 51

Evaluate the algebraic expressions for the given values of each variable.

1)  $xy - 5$  at  $x = 5, y = 2$

2)  $r + s^2$  at  $r = 4, s = 1$

3)  $\frac{c^2}{d}$  at  $c = 6, d = 3$

4)  $m - 3n$  at  $m = 8, n = 2$

5)  $v + w$  at  $v = 2, w = 5$

6)  $pq^2$  at  $p = 1, q = 3$

7)  $2gh$  at  $g = 3, h = 4$

8)  $\frac{a-b}{3}$  at  $a = 9, b = 6$

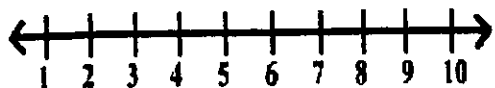
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SoftSchools

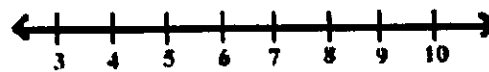
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Solve each inequality and graph the solution

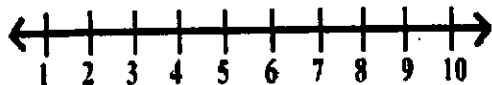
1)  $-3 - 5a < -33$



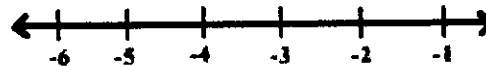
2)  $6x - 7 > 35$



3)  $-9 - 3b < -15$



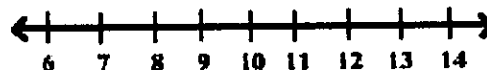
4)  $3(n + 4) > -3$



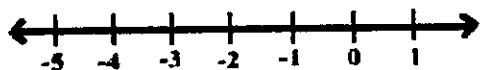
5)  $-11 > y - 10$



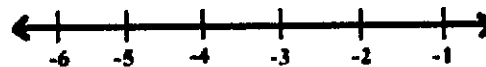
6)  $-4 + s < 1$



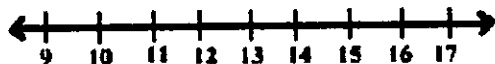
7)  $24 > 6(a + 7)$



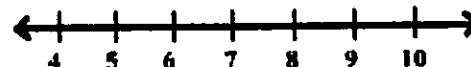
8)  $6(m + 3) > -6$



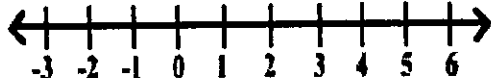
9)  $-64 < 2 - 6y$



10)  $-10 \leq -7 + y - 3$



11)  $n + 12 \geq 2$



12)  $3 - 7 \geq -8$

