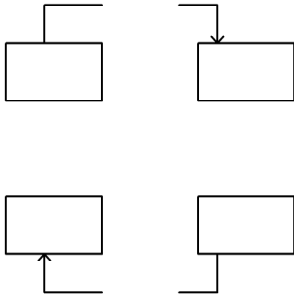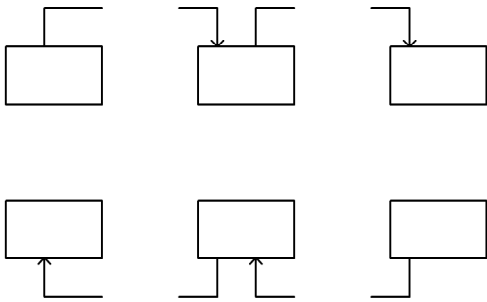# Math 9 - Final Review - Unit 6

1. Solve: $\dfrac{6x}{4} = -12$

2. Solve $-2.5x = 3.75$ by completing the arrow diagram.

3. Solve $31 = -6x + 7$ by completing the arrow diagram.

4. Solve: $20 = \dfrac{-3x}{4} + 5$

5. Solve: $-5(x - 31) = 11.5$

6. Here is a student's solution for this question:
Solve: $3x + 5 = 18$

$$3x + 5 = 18$$
$$\frac{3x}{3} + 5 = \frac{18}{3}$$
$$x + 5 = 6$$
$$x + 5 - 5 = 6 - 5$$
$$x = 1$$

Identify any errors in the solution.

7. A student solved this equation: $3(2x - 5) = 7 - 3x$

$$3(2x - 5) = 7 - 3x$$
$$6x - 5 = 4x$$
$$6x - 5 + 5 = 4x + 5$$
$$6x = 4x + 5$$
$$6x - 4x = 4x + 5 - 4x$$
$$2x = 5$$
$$x = 2.5$$

Identify any errors the student made.

8. Solve: $\dfrac{x}{5} + \dfrac{7}{6} = \dfrac{6}{5}$

9. Car Rental Company A charges $29 a week, plus $13 per kilometre driven.
Car Rental Company B charges $85 a week, plus $6 per kilometre driven.

Determine the distance you must drive for the two rental costs to be the same.
Model the problem with an equation.

10. Define a variable and write an inequality to describe the situation.
The maximum seating capacity of a lecture hall is 240 people.

11. Graph the solution of $w > -2.5$ on a number line.
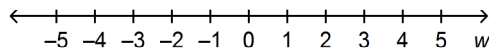
12. Gary has $227.36 in his bank account. He must maintain a minimum balance of $550 in his account to avoid paying a monthly service fee.
How much money can Gary deposit into his account to avoid paying this fee?
a) Choose a variable, then write an inequality that can be used to solve this problem.
b) Solve the problem.

13. State whether you would reverse the inequality sign to solve each inequality.
a) $6 < -x$
b) $2x \geq -4$
c) $\dfrac{x}{-4} < -5$
d) $\dfrac{-x}{3} > 9$

14. A games room charges a $13 entrance fee, plus $2.35 per hour of play time. Anne-Marie has $29.45.
For how long can she play in the games room?
a) Choose a variable and write an inequality for this problem.
b) Solve the inequality.

15. The cost to rent a banquet hall is $500, plus $35 per person. A company's social committee has $4700 to put towards renting a banquet hall.
How many people could attend the function if they rented the banquet hall?
a) Choose a variable and write an inequality to solve the problem.
b) Solve the inequality.

16. Solve: $4x + 28 = 18$
Verify the solution.

17. A cell phone company offers two different plans.
Plan A: Monthly fee of $30, plus $0.32 per minute
Plan B: Monthly fee of $24, plus $0.40 per minute

a) Write an equation to determine the time in minutes that results in the same monthly cost for both plans.
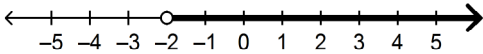b) Solve the equation.
c) Verify the solution.

18. Match each inequality with the graph of its solution below. If an inequality does not have a match, draw the graph of its solution on a number line.

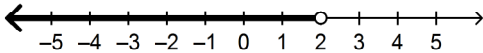a) $p \le 1$
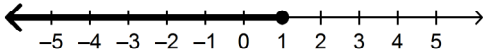
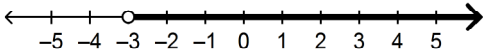b) $q > 2$

c) $r < -2$

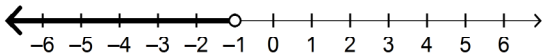d) $s \ge -1$

e) $t > 3$

i)
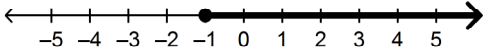
ii)

iii)

iv)

v)

19. Match each inequality with the graph of its solution below.
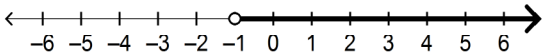For the graph that does not have a match, write the inequality represented by the graph.

a) $2t - 3 < t + 3$

b) $3 + v > 2v + 4$

c) $5x + 6 > 4x + 7$

i)

ii)

iii)
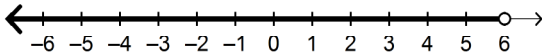
iv)
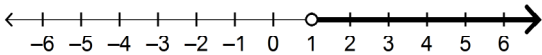
20. a) Solve this inequality: $8 + 3t > 6 - 2t$

    b) Verify the solution by substituting three different numbers in the inequality.

21. Company A charges $17, plus $11 per day to rent a piece of equipment.

    Company B charges $33, plus $9 per day to rent the same piece of equipment.

    a) How many days must the piece of equipment be rented for the cost to be the same at both companies?

    b) How many days must the piece of equipment be rented for Company B to be less expensive?

Math 9 - Final Review - Unit 6
Answer Section

SHORT ANSWER

1. -8

```
        ┌── x −2.5 ──┐
        │            ↓
    ┌───────┐    ┌────────┐
    │   x   │    │ −2.5x  │
    └───────┘    └────────┘

    ┌───────┐    ┌────────┐
    │ −1.5  │    │  3.75  │
    └───────┘    └────────┘
        ↑            │
        └─ ÷ −2.5 ──┘
```

2.

```
        ┌── x −6 ──┐    ┌── + 7 ──┐
        │          ↓    │         ↓
    ┌───────┐  ┌───────┐  ┌──────────┐
    │   x   │  │  −6 x │  │ −6x + 7  │
    └───────┘  └───────┘  └──────────┘

    ┌───────┐  ┌───────┐  ┌──────────┐
    │  −4   │  │   24  │  │    31    │
    └───────┘  └───────┘  └──────────┘
        ↑          ↑           │
        └─ ÷ −6 ──┘ └── −7 ────┘
```
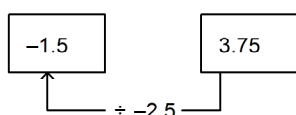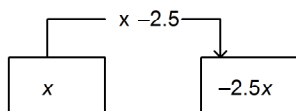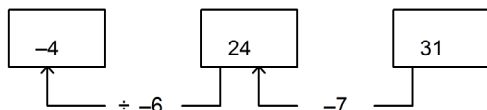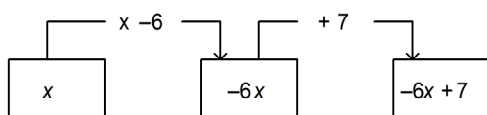
3.
4. -20
5. 28.7
6. Error: If the student is going to divide by 3 first, each term must be divided by 3. Alternatively, the student could subtract 5 from each side first, then divide each side by 3.
7. Errors:
   The student forgot to multiply -5 by 3 when using the distributive property.
   $7 - 3x$ is not equal to $4x$.
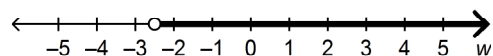8. $x = \dfrac{1}{6}$
9. Let d represent the distance driven.
   $29 + 13d = 85 + 6d$
10. Let p represent the maximum capacity of a lecture hall.
    $p \le 240$

11.

12. a) Let *m* represent the amount of money Gary has to deposit in his bank account.
$227.36 + m \geq 550$
b) $m \geq 322.64$

13. a) Yes
b) No
c) Yes
d) Yes

14. a) Let *h* represent the number of hours of play time.
$13 + 2.35h \leq 29.45$
b) $h \leq 7$

15. a) Let *p* represent the number of people.
$500 + 35p \leq 4700$
b) $p \leq 120$

PROBLEM

16. $4x + 28 = 18$
$4x + 28 - 28 = 18 - 28$
$4x = -10$
$\dfrac{4x}{4} = \dfrac{-10}{4}$
$x = -2.5$

To verify the solution, substitute $x = -2.5$ into $4x + 28 = 18$.

Left side $= 4x + 28$ Right side $= 18$
$ = (4)(-2.5) + 28$
$ = -10 + 28$
$ = 18$

Since the left side matches the right side, $x = -2.5$ is correct.

2

17. a) Let t represent the number of minutes.

$30 + 0.32t = 24 + 0.40t$

b)
$$30 + 0.32t = 24 + 0.40t$$
$$30 + 0.32t - 0.32t = 24 + 0.40t - 0.32t$$
$$30 = 24 + 0.08t$$
$$30 - 24 = 24 + 0.08t - 24$$
$$6 = 0.08t$$
$$\frac{6}{0.08} = \frac{0.08t}{0.08}$$
$$t = 75$$

The monthly costs for both plans are the same at 75 min.

c) Verify: Substitute $t = 75$ into the original equation.

Left side $= 30 + 0.32t$ Right side $= 24 + 0.40t$

$\quad = 30 + 0.32(75)$ $= 24 + 0.40(75)$

$\quad = 30 + 24$ $= 24 + 30$

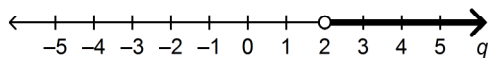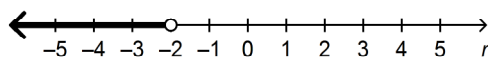$\quad = 54$ $= 54$

Since the left side equals the right side, $t = 75$ is the correct solution.

18. a) Graph iv

b)

c)

d) Graph i

e) Graph v

19. a) Graph iii

b) Graph i

c) Graph iv

The inequality represented by Graph ii is $x > -1$.

20. a) $\qquad 8 + 3t > 6 - 2t$

$$8 + 3t - 3t > 6 - 2t - 3t$$

$$8 > 6 - 5t$$

$$8 - 6 > 6 - 5t - 6$$

$$2 > -5t$$

$$\frac{2}{-5} > \frac{-5t}{-5}$$

$$t > \frac{-2}{5}$$

b) Choose several numbers greater than $\frac{-2}{5}$; for example 0.5, 4, 6

Substitute $t = 0.5$ in the original inequality.

Left side $= 8 + 3t$	Right side $= 6 - 2t$
$= 8 + 3(0.5)$	$= 6 - 2(0.5)$
$= 8 + 1.5$	$= 6 - 1$
$= 9.5$	$= 5$

Since $9.5 > 5$, the left side is greater than the right side, and $t = 0.5$ satisfies the inequality.

Substitute $t = 4$ in the original inequality.

Left side $= 8 + 3t$	Right side $= 6 - 2t$
$= 8 + 3(4)$	$= 6 - 2(4)$
$= 8 + 12$	$= 6 - 8$
$= 20$	$= -2$

Since $20 > -2$, the left side is greater than the right side, and $t = 4$ satisfies the inequality.

Substitute $t = 6$ in the original inequality.

Left side $= 8 + 3t$	Right side $= 6 - 2t$
$= 8 + 3(6)$	$= 6 - 2(6)$
$= 8 + 18$	$= 6 - 12$
$= 26$	$= -6$

Since $26 > -6$, the left side is greater than the right side, and $t = 6$ satisfies the inequality.

21. a) Let d represent the number of days to rent the piece of equipment.

$$17 + 11d = 33 + 9d$$
$$17 + 11d - 9d = 33 + 9d - 9d$$
$$17 + 2d = 33$$
$$17 + 2d - 17 = 33 - 17$$
$$2d = 16$$
$$\frac{2d}{2} = \frac{16}{2}$$
$$d = 8$$

The piece of equipment must be rented for 8 days for the cost to be the same at both companies.

b) Let d represent the number of days to rent the piece of equipment.

$$17 + 11d > 33 + 9d$$
$$17 + 11d - 9d > 33 + 9d - 9d$$
$$17 + 2d > 33$$
$$17 + 2d - 17 > 33 - 17$$
$$2d > 16$$
$$\frac{2d}{2} > \frac{16}{2}$$
$$d > 8$$

The piece of equipment must be rented for 9 or more days for Company B to be less expensive.