Review Exercise 7

Q.1 **Choose the correct answer**

(i) Which of the following is the solution of the inequality $3 - 4x \leq 11$?

(a) -8 (b) -2

(c) $-\dfrac{14}{4}$ (d) None of these

(ii) A statement involving any of the symbols $<, >, \leq$ or $>$, is called------------

(a) Equation   (b) Identity

(c) Inequality   (d) Linear equation

(iii) $x =$ ------- is a solution of the inequality $-z < x > \dfrac{3}{2}$

(a) -5 (b) 3

(c) 0 (d) $\dfrac{3}{2}$

(iv) If x is no larger than 10, then ----------

(a) $x \leq 8$ (b) $x \geq 10$

(c) $x < 10$ (d) $x > 10$

(v) If the capacity < of an elevator is at most 1600 pounds then ----------

(a) $c < 1600$ (b) $c \geq 1600$

(c) $c \leq 1600$ (d) $c > 1600$

(vi) x = 0 is a solution of the inequality ----------

(a) $x > 0$ (b) $3x + 5 < 0$

(c) $x + \dfrac{z}{2} < 0$ (d) $x - 2 < 0$

ANSWER KEY

i	ii	iii	iv	v	vi
b	c	c	b	c	d

Q.2 **Identify the following statement as true or false**

(i) The equation $3x - 5 = 7 - x$ is a linear equation.   (True)

(ii) The equation $x - 0.3x = 0.7x$ is an identity   (True)

(iii) The equation $-2x + 3 = 8$ is equivalent to $-2x = 11$ (False)

(iv) To eliminate fractions we multiply each side of an equation by the L.C.M of denominators   (True)

(v) $4(x + 3) = x + 3$ is a conditional equations   (True)

(vi) The equation $2(3x + 5) = 6x + 12$ is an in consistent equation   (True)

(vii) To solve $\dfrac{2}{3}x = 12$, we should multiply each side by $\dfrac{2}{3}$ (False)

(viii) Equations having exactly the same solution are called equivalent equations.   (True)

(ix) A solution that does not satisfy the original equation is called extra solution   (True)

Q.3   **Answer the following short question.**

(i)   **Define a linear inequality in one variable**

Ans   A linear inequality in one variable x is an inequality in which the variable x occurs only to the first power and has the standard form $ax + b < 0, a \neq 0$

(ii)   **State the trichotomy and transitive properties of in equalities**

Ans   **Trichotomy Property**

For any $a, b \in R$ one and only one of the following statements in true. $a < b$ or $a = b$, or $a > b$

Transitive Property

Let $a, b, c \in R$.

(a)   If $a > b$ and $b > c$, then $a > c$

(b)   If $a < b$ and $b < c$, then $a < c$

(iii)   **The formula relating degree Fahrenheit to degree Celsius is F= $\frac{9}{5}c + 32$ for what value of c is F< O was**

Ans $F = \frac{9}{5}c + 32$

$\frac{9}{5}c + 32 = F$

Since $F < 0$

So $\frac{9}{5}c + 32 < 0$

$\frac{9c + 160}{5} < 0$

Or $9c + 160 < 0 \times 5$

Or $9c + 160 < 0$

Or $9c < -160$

Or $c < -\frac{160}{9}$

(iv)   **Seven times the sum of an integer and 12 is at least 50 and at most 60. Write and solve the inequality that expresses this relation ship**

Solution: Let the integer $= y$

Sum of integer and $12 = y + 12$

Seven times sum of integer and $12 = 7(y + 12)$

According to condition

$50 \leq 7(y + 12) \leq 60$

$\frac{50}{7} \leq 7\frac{(y + 12)}{7} \leq \frac{60}{7}$

$\frac{50}{7} \leq y + 12 \leq \frac{60}{7}$

$\frac{50}{7} - 12 \leq y + \cancel{12} - \cancel{12} \leq \frac{60}{7} - 12$

$$\frac{50-84}{7} \leq y \leq \frac{60-84}{7}$$

$$\frac{-34}{7} \leq y \leq \frac{-24}{7}$$

Solution Set $= \left\{ y \mid \dfrac{-34}{7} \leq y - \dfrac{24}{7} \right\}$

Q.4 **Solve each of the following and check for extraneous solution if any**

(i) $\sqrt{2t+4} = \sqrt{t-1}$

Solution: $\sqrt{2t+4} = \sqrt{t-1}$

Taking square on both side

$$\left(\sqrt{2t+4}\right)^2 = \left(\sqrt{t-1}\right)^2$$

$$2t+4 = t-1$$

$$2t-t = -1-4$$

$$t = -5$$

To check

$$\sqrt{2t+4} = \sqrt{t-1}$$

When $t = -5$

$$\sqrt{2(-5)+4} = \sqrt{t-5-1}$$

$$\sqrt{-10+4} = \sqrt{-6}$$

$$\sqrt{-6} = \sqrt{-6}$$

L.H.S = R.H.S

Solution Set $= \{-5\}$

(ii) $\sqrt{3x-1} - 2\sqrt{8-2x} = 0$

Solution: $\sqrt{3x-1} - 2\sqrt{8-2x} = 0$

$$\sqrt{3x-1} = 2\sqrt{8-2x}$$

Taking square on both side

$$\left(\sqrt{3x-1}\right)^2 = \left(2\sqrt{8-2x}\right)^2$$

$$3x-1 = 4(8-2x)$$

$$3x-1 = 32-8x$$

$$3x+8x = 32+1$$

$$11x = 33$$

$$x = \frac{33}{11}$$

$$x = 3$$

To check

$$\sqrt{3x-1} - 2\sqrt{8-2x} = 0$$

When $x = 3$

$$\sqrt{3(3)-1} - 2\sqrt{8-2(3)} = 0$$

$$\sqrt{9-1} - 2\sqrt{8-6} = 0$$

$$\sqrt{8} - 2\sqrt{2} = 0$$

$$2\sqrt{2} - 2\sqrt{2} = 0$$

$$0 = 0$$

L.H.S = R.H.S

Solution Set $= \{3\}$

Q.5 **Solve for** x

(i) $\quad |3x+14| - 2 = 5x$

Solution: $|3x+14| - 2 = 5x$

$$|3x+14| = 5x+2$$

$$3x+14 = \pm(5x+2)$$

$3x+14 = 5x+2$	$3x+14 = -(5x+2)$
$14-2 = 5x-3x$	
$12 = 2x$	$3x+14 = -5x-2$
$\dfrac{12}{2} = x$	$3x+5x = -2-14$
	$8x = \dfrac{-16}{8}$
$x = 6$	$x = -2$
To check	
$|3x+14| - 2 = 5x$	$|3x+14| - 2 = 5x$
When $x = 6$	when $x = -2$
$|3(6)+14| - 2 = 5(6)$	$|3(-2)+14| - 2 = 5(-2)$
$|18+14| - 2 = 30$	$|-6+14| - 2 = -10$
$32-2=30$	$8-2 = -10$
$30 = 30$	$6 = -10$

Solution Set $= \{6\}$

(ii) $\quad \dfrac{1}{3}|x-3| = \dfrac{1}{2}|x+2|$

Solution $\dfrac{1}{3}|x-3| = \dfrac{1}{2}|x+2|$

$$\frac{2}{3}|x-3| = |x+2|$$

$$\frac{2}{3} = \frac{|x+2|}{|x-3|}$$

$$\frac{x+2}{x-3} = \pm\frac{2}{3}$$

$$\frac{x+2}{x-3} = \frac{2}{3} \qquad \text{and} \qquad \frac{x+2}{x-3} = -\frac{2}{3}$$

$$3(x+2) = 2(x-3) \qquad\qquad 3(x+2) = -2(x-3)$$

$$3x+6 = 2x-6 \qquad\qquad 3x+6 = -2x+6$$

$$3x-2x = -6-6 \qquad\qquad 3x+2x = +6-6$$

$$x = -12 \qquad\qquad\qquad 5x = 0$$

To check $\qquad\qquad\qquad\qquad x = \dfrac{0}{5} \Rightarrow x = 0$

$$\frac{1}{3}|x-3| = \frac{1}{2}|x+2| \qquad\qquad \frac{1}{3}|x-3| = \frac{1}{2}|x+2|$$

When $x = -12$ $\qquad\qquad$ when $x = 0$

$$\frac{1}{3}|-12-3| = \frac{1}{2}|-12+2| \qquad \frac{1}{3}|0-3| = \frac{1}{2}|0+2|$$

$$\frac{1}{3}|-15| = \frac{1}{2}|-10| \qquad\qquad \frac{1}{3}|-3| = \frac{1}{2}|2|$$

$$\frac{1}{\cancel{3}}\left(\cancel{15}^{5}\right) = \frac{1}{\cancel{2}}\left(\cancel{10}^{5}\right) \qquad \frac{1}{\cancel{3}}\left(\cancel{3}^{1}\right) = \frac{1}{\cancel{2}}\left(\cancel{2}^{1}\right)$$

$$5 = 5 \qquad\qquad\qquad \frac{1}{3}(3) = 1$$

$$1 = 1$$

Solution Set $= \{-12, 0\}$

Q.6 **Solve the following inequality**

(i) $\quad -\dfrac{1}{3}x + 5 \le 1$

Solution $-\dfrac{1}{3}x + 5 \le 1$

$$-\frac{1}{3}x \le 1-5$$

$$-\frac{1}{3}x \le -4$$

$$x \ge -4 \times (-3)$$

$$x \ge 12$$

Solution Set $= \{x \mid x \ge 12\}$

(ii) $\quad -3 < \dfrac{1-2x}{5} < 1$

Solution $-3 < \dfrac{1-2x}{5} < 1$

$$-3 < \frac{1-2x}{5} \qquad\qquad \frac{1-2x}{5} < 1$$

$-15 < 1 - 2x$ $\qquad$ $1 - 2x < 5$

$-15 - 1 < -2x$ $\qquad$ $-2x < 5 - 1$

$-16 < -2x$ $\qquad$ $-2x < 4$

$\dfrac{-16}{-2} > x$ $\qquad$ $x > \dfrac{4}{-2}$

$8 > x$ $\qquad$ $x > -2$

$x < 8$ $\qquad$ $-2 < x$

$\qquad$ $-2 < x < 8$

Solution Set $= \{x \mid -2 < x < 8\}$

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Report any mistake at freeilm786@gmail.com