

DAYCP-INEQ-2425-ASM-SET 1-MATH**Suggested solutions****Multiple Choice Questions**

1. B	2. A	3. B	4. C	5. D
6. B	7. B	8. D	9. A	10. D
11. C	12. A	13. D	14. A	15. C
16. B	17. D	18. B	19. C	20. B
21. B	22. B	23. D	24. A	25. D
26. B	27. C	28. B	29. A	30. C

1. **B**

$$\begin{array}{ll} 2x + 9 < 1 & \text{or} \quad 1 - \frac{x}{2} \geq 0 \\ 2x < -8 & -\frac{x}{2} \geq -1 \\ x < -4 & x \leq 2 \end{array}$$

Thus, $x \leq 2$.2. **A**

$$\begin{array}{ll} -3x - 2 > \frac{x + 10}{2} & \text{or} \quad -9 - 2x > -1 \\ -\frac{7x}{2} > 7 & -2x > 8 \\ x < -2 & x < -4 \end{array}$$

Thus, $x < -2$.3. **B**

$$\begin{array}{ll} -2 - 3x > 1 & \text{and} \quad \frac{x}{2} + 1 < 2 \\ -3x > 3 & \frac{x}{2} < 1 \\ x < -1 & x < 2 \end{array}$$

Thus, $x < -1$.4. **C**

$$\begin{array}{ll} 2x - 5 \leq 5x + 1 & \text{and} \quad 5x + 1 < 16 \\ -3x \leq 6 & 5x < 15 \\ x \geq -2 & x < 3 \end{array}$$

Thus, $-2 \leq x < 3$.

5. D

$$\begin{array}{ll} 2x + 3 > 7 & \text{and} \quad 3 - \frac{x+3}{4} < x + 1 \\ 2x > 4 & -\frac{5x}{4} < -\frac{5}{4} \\ x > 2 & x > 1 \end{array}$$

Thus, $x > 2$.

6. B

$$\begin{array}{ll} 8 + x > 3x - 7 & \text{and} \quad \frac{3-x}{2} \geq 4 \\ -2x > -15 & -\frac{x}{2} \geq \frac{5}{2} \\ x < \frac{15}{2} & x \leq -5 \end{array}$$

Thus, $x < \frac{15}{2}$.

7. B

$$\begin{array}{ll} \frac{x+1}{2} + \frac{x}{3} \geq 8 & \text{and} \quad 2x + 3 < 4x - 5 \\ \frac{5x}{6} \geq \frac{15}{2} & -2x < -8 \\ x \geq 9 & x > 4 \end{array}$$

Thus, $x \geq 9$.

8. D

$$\begin{array}{ll} \frac{6-x}{2} \leq x - 3 & \text{or} \quad 9 - 2x \geq 1 \\ -\frac{3x}{2} \leq -6 & -2x \geq -8 \\ x \geq 4 & x \leq 4 \end{array}$$

Thus, x can be any real number.

9. A

$$\begin{array}{ll} -5x < \frac{2}{3} & \text{and} \quad \frac{2}{3} < 4x \\ x > -\frac{2}{15} & x > \frac{1}{6} \end{array}$$

Thus, $x > \frac{1}{6}$.

10. D

$$\begin{array}{ll} 6x - 5(x+1) > -6 & \text{or} \quad 3 < \frac{8-x}{3} \\ x > -1 & \frac{x}{3} < -\frac{1}{3} \\ & x < -1 \end{array}$$

Thus, $x \neq -1$.

11. C

$$2(1-x) > 6x \quad \text{and} \quad x \leq \frac{4x+1}{-2}$$

$$-8x > -2 \qquad 3x \leq -\frac{1}{2}$$

$$x < \frac{1}{4} \qquad x \leq -\frac{1}{6}$$

Thus, $x \leq -\frac{1}{6}$.

The greatest value of x is -1 .

12. A

$$-4x < 6-x \quad \text{and} \quad 5(x+1) > 17+x$$

$$-3x < 6 \qquad 4x > 12$$

$$x > -2 \qquad x > 3$$

Thus, $x > 3$.

13. D

$$x+6 \geq 10 \quad \text{and} \quad \frac{14-x}{2} > 5$$

$$x \geq 4 \qquad -\frac{x}{2} > -2$$

$$x < 4$$

Thus, the inequality has no solution.

14. A

$$\frac{6x-1}{7} > 5 \quad \text{or} \quad 4-3(1-x) > 7$$

$$\frac{6x}{7} > \frac{36}{7} \qquad 3x > 6$$

$$x > 2$$

$$x > 6$$

Thus, $x > 2$.

15. C

$$-3(4-x) \leq 9 \quad \text{or} \quad \frac{7x+2}{5} < -8$$

$$3x \leq 21 \qquad \frac{7x}{5} < -\frac{42}{5}$$

$$x \leq 7 \qquad x < -6$$

Thus, $x \leq 7$.

The greatest integer is 7.

16. B

$$2-2x \geq \frac{4-x}{3} \quad \text{or} \quad \frac{x}{2} + \frac{1}{3} < \frac{1}{6}$$

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

Thus, $x \leq \frac{2}{5}$.

17. D

$$3x - 5 > -8 \quad \text{and} \quad 9 - x \leq 3$$

$$3x > -3 \qquad -x \leq -6$$

$$x > -1 \qquad x \geq 6$$

Thus, $x \geq 6$.

18. B

$$-7 < 1 - 2x \quad \text{and} \quad 1 - 2x < x + 4$$

$$2x < 8 \qquad -3x < 3$$

$$x < 4 \qquad x > -1$$

Thus, $-1 < x < 4$.

19. C

$$-7(5 + 2x) \geq -5x + 1 \quad \text{and} \quad \frac{3x + 4}{5} < -4$$

$$-9x \geq 36 \qquad \frac{3x}{5} < -\frac{24}{5}$$

$$x \leq -4 \qquad x < -8$$

Thus, $x < -8$.

20. B

$$x - \frac{2x - 24}{5} < 3 \quad \text{or} \quad -6 + 2x < 4x$$

$$5x - (2x - 24) < 15 \qquad x > -3$$

$$x < -3$$

Thus, $x \neq -3$.

21. B

$$\frac{67}{2} - 3x \leq \frac{1}{2} \quad \text{and} \quad x - 1 > 0$$

$$-3x \leq -33 \qquad x > 1$$

$$x \geq 11$$

Thus, $x \geq 11$.

22. B

$$3 > 4 - x \quad \text{and} \quad 1 - \frac{6 - x}{2} > -1$$

$$x > 1 \qquad x > 2$$

Thus, $x > 2$.

23. D

$$\frac{1-3x}{2} \leq 5-2x \quad \text{or} \quad x-7 \geq 2$$

$$\frac{x}{2} \leq \frac{9}{2} \quad x \geq 9$$

$$x \leq 9$$

Thus, x can be any real number.

24. A

$$3x-1 > 5 \quad \text{or} \quad 3-2x < 5$$

$$x > 2 \quad x > -1$$

Thus, $x > -1$.

25. D

$$3-2(x-5) \geq 19 \quad \text{or} \quad \frac{4x+1}{3} < 6$$

$$-2x \geq 6 \quad \frac{4x}{3} < \frac{17}{3}$$

$$x \leq -3 \quad x < \frac{17}{4}$$

Thus, $x < \frac{17}{4}$.

The greatest integer is 4.

26. B

$$x - \frac{x-3}{2} > 7 \quad \text{or} \quad 3 < x-12$$

$$\frac{x}{2} > \frac{11}{2} \quad x > 15$$

$$x > 11$$

Thus, $x > 11$.

27. C

$$5x-11 < 9 \quad \text{or} \quad 4-3x > 7$$

$$5x < 20 \quad -3x > 3$$

$$x < 4 \quad x < -1$$

Thus, $x < 4$.

28. B

$$4-x < 2-3x \quad \text{or} \quad x+3 > 2x-5$$

$$2x < -2 \quad -x > -8$$

$$x < -1 \quad x < 8$$

Thus, $x < 8$.

29. A

The graph $y = -x^2 - 2cx + c - 20$ lies on or below the x -axis.

The equation $-x^2 - 2cx + c - 20 = 0$ has repeated real roots or no real roots.

$$\Delta = (-2c)^2 - 4(-1)(c - 20) \leq 0$$

$$4c^2 + 4c - 80 \leq 0$$

$$-5 \leq c \leq 4$$

30. C

The graph of $y = f(x)$ lies below the x -axis.

$$\Delta = (2k)^2 - 4(-1)(-4) < 0$$

$$4k^2 - 16 < 0$$

$$-2 < k < 2$$

The greatest integral value of k is 1.

Conventional Questions

31. (a) $\frac{1}{3}(5x - 1) < \frac{x + 4}{2} + 2$
 $\frac{7x}{6} < \frac{13}{3}$
 $x < \frac{26}{7}$ 1A
 $21 \geq -7x$
 $x \geq -3$ 1A
 Thus, we have $-3 \leq x < \frac{26}{7}$. 1M
- (b) 1, 2, 3 1A
32. (a) $5x - 11 < \frac{2(x - 3)}{4}$
 $\frac{9x}{2} < \frac{19}{2}$
 $x < \frac{19}{9}$ 1A
- (b) $5x - 41 \leq 0$
 $x \leq \frac{41}{5}$ 1A
 Thus, $x \leq \frac{41}{5}$. 1M
 There are 8 positive integers. 1A
33. (a) Slope of the line = $\frac{11 - 8}{3 - 0} = 1$.
 $\log_2 y = x + 8$ 1M
 $y = 2^{x+8}$
 $= 256(2^x)$
 Thus, $a = 256$ and $b = 2$. 1A+1A
- (b) $256(2^{2t}) - 256(2^t) \geq 32\,768$ 1M
 $256(2^{2t}) - 256(2^t) - 32\,768 \geq 0$
 $2^t \geq 11.8$ or $2^t \leq -10.8$ (rejected)
 $t \log 2 \geq \log 11.8$ 1M
 $t \geq 3.56$
 The least integral value of t is 4. 1A