Midterm I Solution

#1. $6x + 5 \geqslant x - 10$

$5x \geqslant -15$

$x \geqslant -3$

Answer: $\underline{\{x \mid x \geqslant -3\}}$.

#2. $\dfrac{2-x}{4} - \dfrac{3}{8} \geqslant \dfrac{2}{5}x$

Multiply 40 to both sides

$10(2-x) - 15 \geqslant 16x$

$20 - 10x - 15 \geqslant 16x$

$5 \geqslant 26x$

$\dfrac{5}{26} \geqslant x$.

Answer: $\underline{\left(-\infty, \frac{5}{26}\right]}$.

#3. $f(-2) = 2(-2)^2 - 4(-2) + 1 = \underline{17}$: Answer.

#4. $r(-2) = 3 - 6x - 3 \cdot (2)^2 = \underline{-6x - 9}$: Answer.

#5. The slope of a straight line that is parallel to the line $3x + y = -3$ is -3. From the hypothesis, the line passes through $(3, 2)$

$\left< \begin{array}{l} \text{slope} : -3 \\ \text{point} : (3,2) \end{array} \right. \Rightarrow$ line: $\underline{y = -3(x-3) + 2}$. Answer.

#6. The slope of a straight line that is perpendicular to $y = \frac{5}{2}x - 4$ is $-\frac{2}{5}$. By assumption the straight line contains $(2, -5)$.

$\left< \begin{array}{l} \text{slope} \quad -\frac{2}{5} \\ \text{point} \quad (2, -5) \end{array} \right. \Rightarrow$ line $\underline{y = -\frac{2}{5}(x-2) \; \cancel{-5}}$. Answer.

#7. $\dfrac{3}{4} = \dfrac{1}{12}x + 12 \quad \Leftrightarrow \quad 9 = x + 144 \Leftrightarrow x = \underline{-135}$. Answer.

#8. Three Consecutive integers $n-2 \quad n \quad n+2$

Sum: $3n = 84$. So $n = 28$.

Three integers are $\underline{26, \ 28 \ \text{and} \ 30.}$ Answer.

#9 Let width $= w$, and length $= l$. It is given that

$$W = 25\% \ \text{of} \ l \ = \tfrac{1}{4} l.$$

Perimeter $= 2(w+l) = 2\left(\tfrac{1}{4}+1\right) l \ \overset{given}{=} 250.$

$\iff \quad 10 l = 1000.$ $\iff l = 100.$ $W = \tfrac{1}{4} l = 25.$

$\underline{l = 100 \ cm.} \qquad w = 25 \ cm$ Answer

#10. Write $4x+y > -1$ into $4x+1 > -y$ and Combine with $4x+1 < 5$.

$-y < 4x+1 < 5.$ $\iff -8 < 4x < 4 \iff -2 < x < 1$

Answer $\underline{(-2, 1)}$.

#11. $f(c) = 3c+1 = -8 \implies \underline{c = -3.}$ Answer. $\underline{(-3, -8)}$ Answer.

#12. x - intercept: $3x + 2 \cdot 0 = 4$ $\quad \underline{x = \tfrac{4}{3}}$ Answer

y - intercept: $3 \cdot 0 + 2y = 4$ $\quad \underline{y = 2}$ Answer

More precisely, the answer should be written in a form of number. So $\tfrac{4}{3}$ is the answer and 2 is the answer.
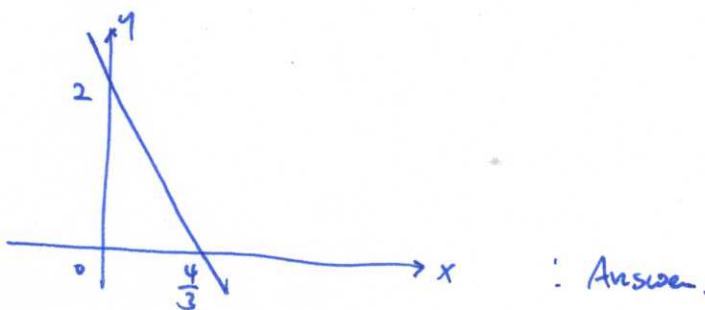
: Answer.

#13.

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{-2-1}{-1-4} = \frac{-3}{-5} = \frac{3}{5}$$

—— Answer

#14.

$$\begin{cases} \text{Slope} = \frac{5-(-3)}{-4-0} = \frac{8}{-4} = -2. \quad \text{line}: \underline{y = -2x - 3}. \\ \text{A point}: (0, -3) \end{cases}$$

—— Answer.

#15.

$3x + y = 4 \quad \text{and} \quad x + y = 2.$

$3x + y = 2x + x + y = 2x + 2 = 4. \Rightarrow x = 1.$

$\begin{cases} x + y = 2 \Rightarrow y = 1. \\ x = 1 \end{cases}$

Answer $\underline{x = 1 \text{ and } y = 1}$

—— Answer