Inequalities and Absolute Value. Form A

1. The inequality $5 - 2x \leq 25$ is equivalent to which of the following inequalities?

(A) $x \leq 10$
(B) $x > -10$
(C) $x \geq -10$
(D) $x \leq -10$
(E) $x \geq 10$

$5 - 2x \leq 25$
$-2x \leq 20$ $\quad -5$
$x \geq -10$ $\quad \div(-2)$

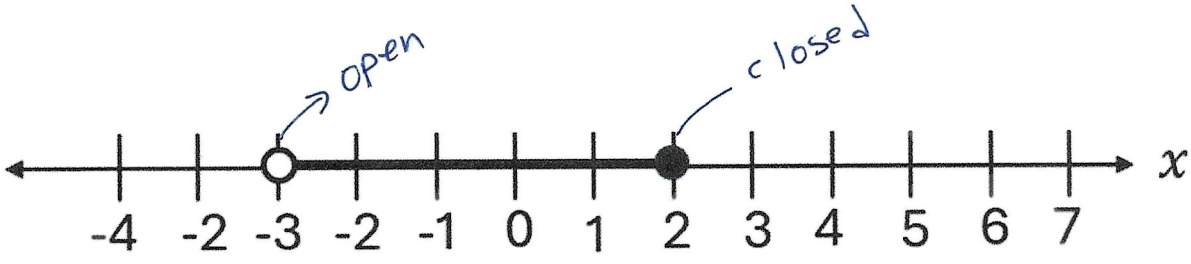
Sign of inequality changes when x or ÷ by a negative #

2. The inequality $2(5 - 3x) > 3(x - 1)$ is equivalent to which of the following inequalities?

(A) $x < \frac{13}{9}$
(B) $x > \frac{13}{6}$
(C) $x < \frac{9}{6}$
(D) $x > \frac{9}{6}$
(E) $x < 3$

$2(5-3x) > 3(x-1)$
$10 - 6x > 3x - 3$
$-6x - 3x > -3 - 10$
$-9x > -13$
$x < \frac{13}{9}$

3. Which of the following inequalities represents the graph shown below on the real number line?



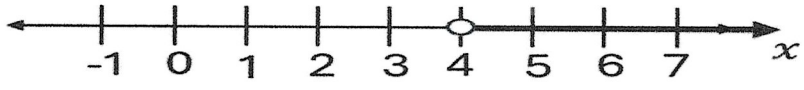
(A) $-3 \leq x < 2$
(B) $3 < x \leq 2$
(C) $-3 \leq x \leq 2$
(D) $-2 < x \leq 1$
(E) $-3 < x \leq 2$

4. Which of the following inequalities represents the graph shown below on the real number line?

(A) $-2 < x \text{ or } 5 < x$
(B) $-2 \geq x \text{ and } 5 \geq x$
(C) $-2 \leq x \text{ and } 5 \geq x$
(D) $-2 \geq x \text{ or } 5 \leq x$
(E) $-2 \geq x \text{ or } 5 \geq x$

5. Which of the following inequalities represents the graph $x > 4$ on the real number line?

A



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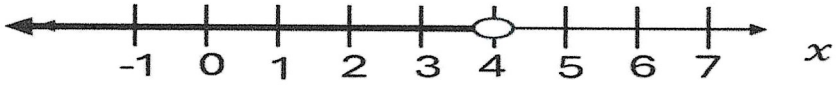

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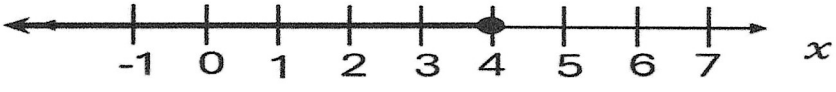
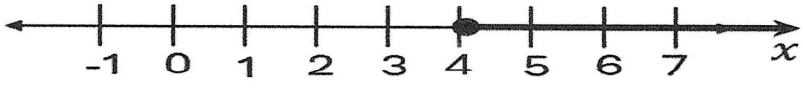
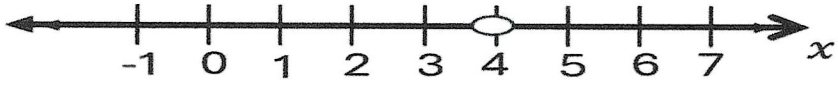


D



E



$A > 0$ means A is positive

$AB > 0$ means A and B are both + or both negative

6. Which of the following represent the values of x that are the solutions for the inequality $(x+3)(1-x) \geq 0$?

(A) $-3 \leq x < 1$
(B) $-3 \leq x \leq 1$
(C) $-1 \leq x \leq 3$
(D) $1 \geq x$ or $-3 \geq x$
(E) $-1 \geq x$ or $3 \geq x$

$(x+3)(1-x) \geqslant 0$

$(x+3)$ and $(1-x)$ need to have same sign since their product is positive

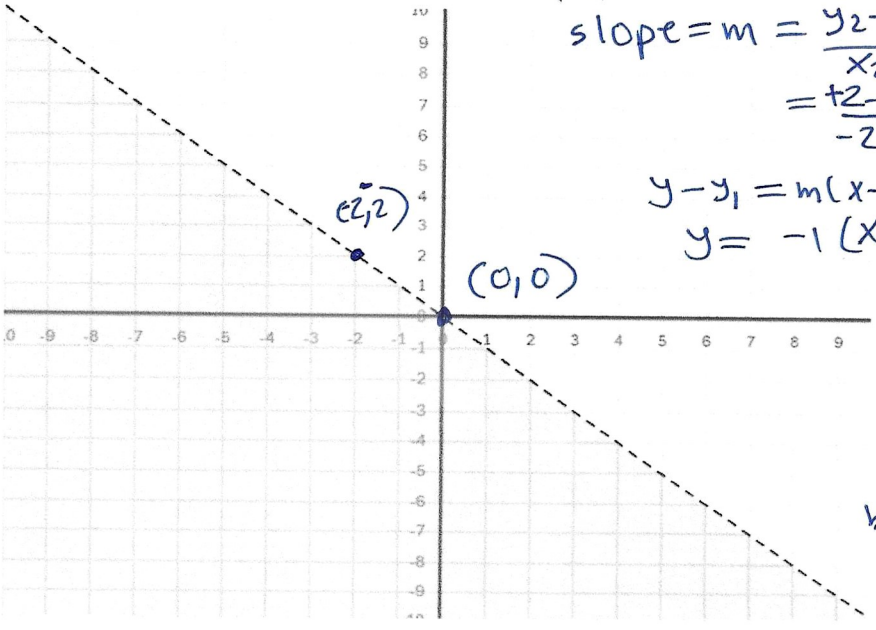
so $x+3 \geqslant 0 \Rightarrow x \geqslant -3$

$1-x \geqslant 0 \Rightarrow 1 \geqslant x$

$-3 \leq x \leq 1$

7. Which of the following is the inequality for the graph given below in the standard (x, y) coordinate plane?

(A) $y + x < 0$
(B) $y - x > 0$
(C) $y \geq x$
(D) $y \leq x$
(E) $-9 < y + x \leq 0$



Pick two points on dotted line $(0,0)$ and $(-2,2)$

$x_1\ y_1$ $\quad$ $x_2\ y_2$

slope $= m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-0}{-2-0} = \frac{2}{-2} = -1$

$y - y_1 = m(x - x_1)$

$y = -1(x)$

$y = -x$

so $y + x < 0$ since shaded area is below graph or line

8. Which of the following graphs below is the representation for the inequality $5y \geq 2x + 25$?

Find equation of line

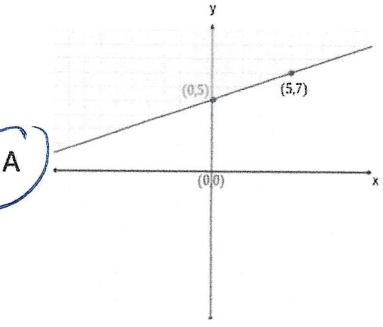
$5y = 2x + 25$

$y = \frac{2}{5}x + 5$

slope is positive and y-intercept is 5

$\geqslant$ means line is solid and shaded area above line so answer is A

A



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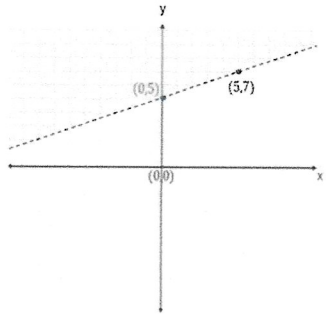

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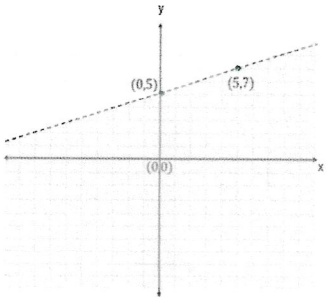

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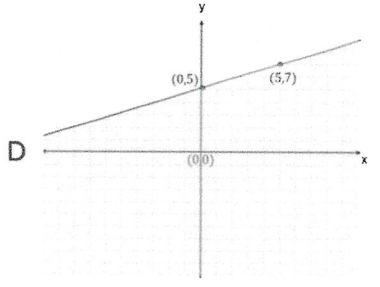
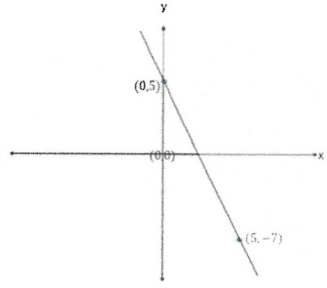
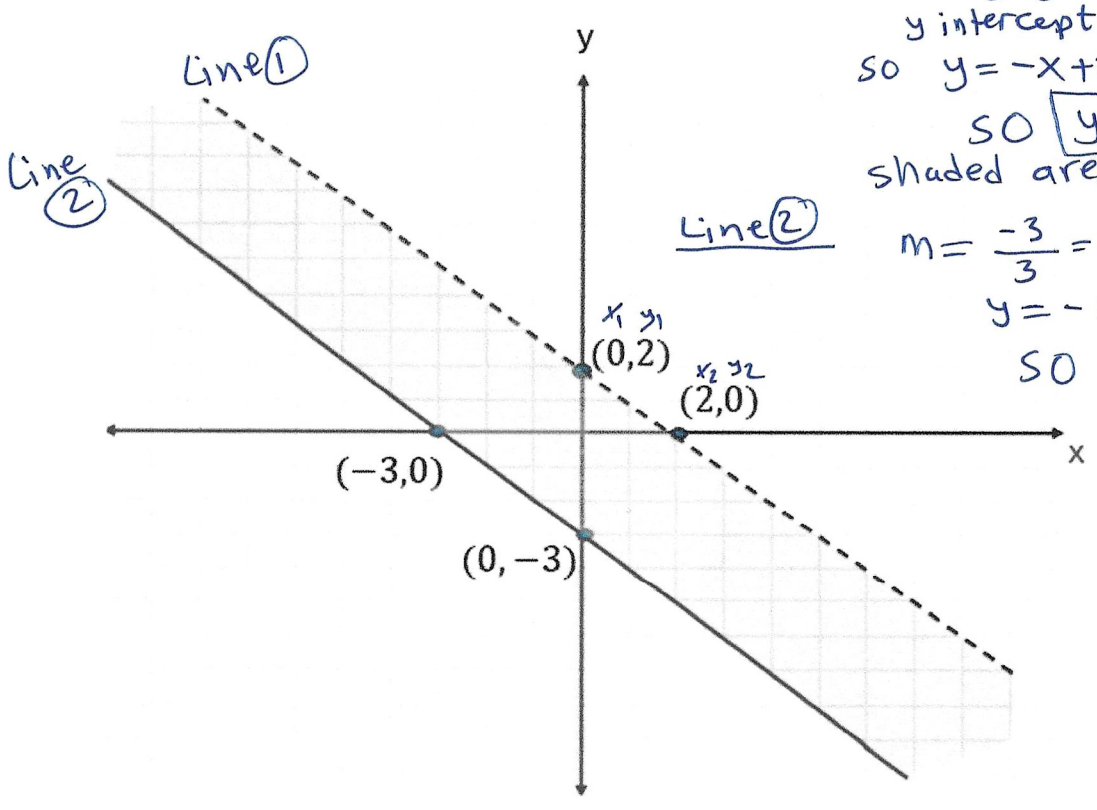


E



9. Which of the following is the inequality for the graph shown below in the standard (x, y) coordinate plane?



Line ①

$m = \frac{0-2}{2-0} = \frac{-2}{2} = -1$

y intercept = 2

so $y = -x + 2$ line is dotted

so $y + x - 2 < 0$ since shaded area below line.

Line ②

$m = \frac{-3}{3} = -1$ $b = -3$

$y = -x - 3$ or $y + x + 3 = 0$

so $y + x + 3 \geq 0$ line solid & shaded area above line

(A)) $0 < x + y \leq -3$

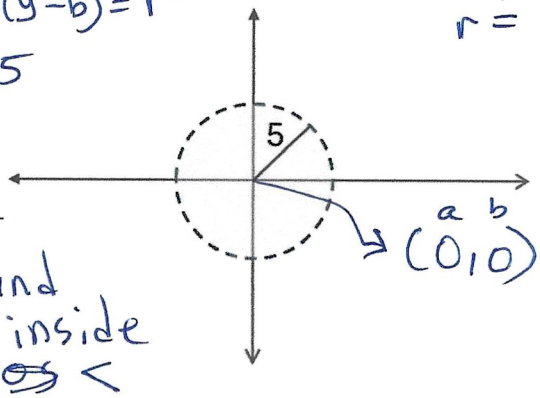
(B) $y - x > -3$
(C) $-3 \leq x + y < 2$
(D) $-3 < x + y \leq 2$
(E) $-3 < y \leq 2$

10. Which of the following is the inequality for the graph shown below in the standard (x, y) coordinate plane for the circle at the origin and a radius of 5 inches?

(A)) $x^2 - y^2 \leq 25$
(B) $x^2 + y^2 \leq 5$
(C) $x^2 + y^2 < 25$
(D) $x^2 + y^2 \leq 5$
(E) $x^2 - y^2 \leq 5$

Equation of circle
$(x-a)^2 + (y-b)^2 = r^2$
$x^2 + y^2 = 25$

(a,b) center
r = radius



or $x^2 + y^2 < 25$
line dotted and shaded area inside
so ~~<~~ <

11. What is the value of the expression $|-4| - |7 - 49| + 1$?

(A) 47
(B) -38
(C) -37
(D) 37
(E) 38

$|-4| - |7-49| + 1$
$= 4 - |-42| + 1$
$= 4 - 42 + 1 =$

12. What is the value of the expression $|3(-3) - 18|$?

(A) 27
(B) -27
(C) -9
(D) 9
(E) 18

$= |-9-18| = |-27| = 27$

13. What is the solution to the equation $|3x - 1| = 4$?

(A) $x = 1$ *or* $x = \frac{5}{3}$

$3x - 1 = 4$
$3x = 5$
$x = \frac{5}{3}$

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

(B) $x = -1$ *or* $x = -\frac{5}{3}$

(C) $x = -1$ *or* $x = \frac{5}{3}$

(D) $x = -1$ *or* $x = \frac{3}{5}$

(E) $x = -1$ *or* $x = \frac{4}{3}$

14. What is the solution to the equation $|1 - 2x| = 4$?

(A) $x = \frac{5}{2}$ *or* $x = \frac{3}{2}$

(B) $x = -\frac{2}{3}$ *or* $x = \frac{2}{5}$

(C) $x = \frac{3}{2}$ *or* $x = -\frac{5}{2}$

(D) $x = -3$ *or* $x = 5$

(E) $x = -\frac{3}{2}$ *or* $x = \frac{5}{2}$

$1-2x=4$
$1-4=2x$
$-3=2x$
$x=\frac{-3}{2}$

$1-2x=-4$
$1+4=2x$
$5=2x$
$x=\frac{5}{2}$
$x=\frac{5}{2}$

15. What is the solution to the inequality $|x - 4| < 7$?

(A) $-3 \leq x \leq 11$

(B) $x > 11$ *or* $x < -3$

(C) $-3 < x < 11$

(D) $x = -3$ *or* $x = 11$

(E)) $-11 < x < 3$

$x-4<7$
$x<11$

$x-4>-7$
$x>-3$

16. What is the solution to the inequality $|x + 3| > 5$?

(A) $-8 \leq x \leq 2$

(B) $x > 2$ *or* $x < -8$

(C) $-8 < x < 2$

(D) $x = -8$ *or* $x = 2$

(E)) $x > -8$ *or* $x < 2$

$x+3>5$
$x>2$

$x+3<-5$
$x<-8$

OR

17. What is the solution to the inequality $-2|2x+3|+14 \geq -16$?

(A) $-9 \leq x \leq 6$
(B) $x \geq 6$ *or* $x \leq -9$
(C) $-9 < x < 2$
(D) $x = -9$ *or* $x = 6$
(E)) $x > -9$ *or* $x < 6$

$-2|2x+3| \geq -30 \quad -14$
$|2x+3| \leq 15 \quad \div(-2)$
$2x+3 \leq 15$ $\quad$ $2x+3 \geq -15$
$2x \leq 12$ $\quad x \leq 6$ $\quad 2x \geq -18$
$x \geq -9$

18. What is the solution to the inequality $|-2x+7|+5 \geq 14$?

(A) $-1 \leq x \leq 8$
(B) $x \leq -1$ *or* $x \geq 8$
(C) $-1 < x < 8$
(D) $x = 8$ *or* $x = -1$
(E)) $x \leq 16$

$|-2x+7| \geq 9$
$-2x+7 \geq 9$ $\quad$ $-2x+7 \leq -9$
$-2x \geq 2$ $\quad$ $-2x \leq -16$
$x \leq -1$ $\quad$ $x \geq 8$

OR

19. What is the solution to the inequality $2|x+4|+6 > -2$?

(A) $0 < x < 8$
(B) $x > 0$ *or* $x < -8$
(C) $-\infty < x < \infty$
(D) $x = 8$ *or* $x = 0$
(E)) $x \leq 8$

$2|x+4| > -8$
$|x+4| > -4$
$x+4 > -4$ $\quad$ $x+4 < 4$
$x > -8$ $\quad$ $x < 0$

20. What is the solution to the inequality $\frac{|3x-3|}{-5} > -12$?

(A) $-19 < x < 21$
(B) $x > 21$ *or* $x < -19$
(C) $-\infty < x < \infty$
(D) $x = -19$ *or* $x = 21$
(E)) $x < 60$

$|3x-3| < 60$
$3x-3 < 60$ $\quad$ $3x-3 > -60$
$3x < 63$ $\quad$ $3x > -57$
$x < 21$ $\quad$ $x > -19$

1. C 11. C
2. A 12. A
3. E 13. C
4. D 14. E
5. A 15. C

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6. B
7. A
8. A
9. C
10. C
16. B
17. A
18. B
19. C
20. A