Name: Date:
Teacher: Class/Period:

**1)** Find the solution set of $|x - 2| < 6$.

**A.** $\{x \mid -8 < x < 4\}$

**B.** $\{x \mid -4 < x < 8\}$

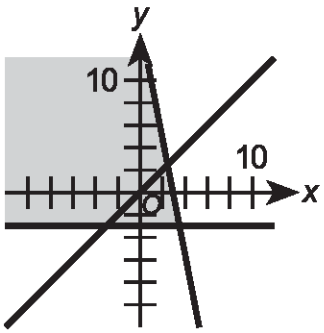
**C.** $\{x \mid x < 4\}$

**D.** $\{x \mid x < 8\}$

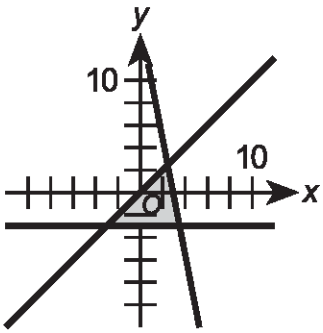
**2)** Which graph represents the solution set to this system of equations?

$$\begin{cases} y \le x \\ y \ge -3 \\ y \le 15 - 5x \end{cases}$$

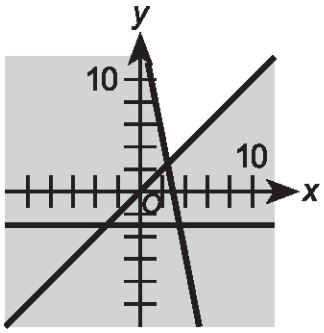
**A.**



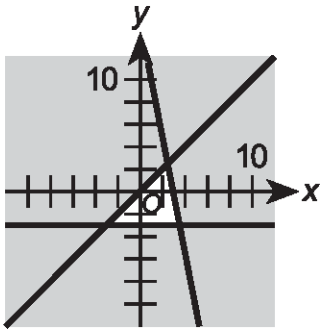

**C.**




**B.**




**D.**



**3)** What are the zeros of the quadratic function $f(x) = x^2 + 3x + 1$ ?

**A.** $\frac{-3 \pm \sqrt{5}}{2}$

**B.** $\frac{-3 \pm \sqrt{13}}{2}$

**C.** $\frac{3 \pm \sqrt{5}}{2}$

**D.** $\frac{3 \pm \sqrt{13}}{2}$

**4)** What is the equation of the circle with center (3,−6) and radius $\frac{15}{8}$ ?

**A.** $(x - 3)^2 + (y + 6)^2 = \frac{225}{64}$

**B.** $(x - 3)^2 + (y + 6)^2 = \frac{15}{8}$

**C.** $(x + 3)^2 + (y - 6)^2 = \frac{225}{64}$

**D.** $(x + 3)^2 + (y - 6)^2 = \frac{15}{8}$

**5)** The radius of circle $O$ is 15 m. Two radii, $\overline{OA}$ and $\overline{OB}$, form an angle of 80°. To the nearest tenth of a meter, how long is chord $\overline{AB}$ ?

**A.** 14.8

**B.** 15.0

**C.** 19.3

**D.** 21.2

**6)** What is $AB$ ?

$$A = \begin{bmatrix} -3 & 1 \\ 6 & 0 \\ 4 & 2 \\ 9 & 7 \end{bmatrix} \qquad B = \begin{bmatrix} 2 & 6 \\ 5 & 1 \end{bmatrix}$$

**A.** $\begin{bmatrix} 52 & 156 \\ 130 & 26 \end{bmatrix}$

**B.** $\begin{bmatrix} -1 & -17 \\ 12 & 36 \\ 18 & 26 \\ 53 & 61 \end{bmatrix}$

**C.** $\begin{bmatrix} -6 & 6 \\ 30 & 0 \\ 8 & 12 \\ 45 & 7 \end{bmatrix}$

**D.** $\begin{bmatrix} -42 & 14 \\ 84 & 0 \\ 56 & 28 \\ 126 & 98 \end{bmatrix}$

**7)** What is the solution set to the inequality $|3x - 2| < 7$ ?

**A.** $\{x \mid -\frac{5}{3} < x < 3\}$

**B.** $\{x \mid -3 < x < \frac{5}{3}\}$

**C.** $\{x \mid x > 3 \text{ or } x < -\frac{5}{3}\}$

**D.** $\{x \mid x > \frac{5}{3} \text{ or } x < -3\}$

**8)** Which transformations can be performed on the graph of $f(x) = x^2$ that result in the graph of $f'(x) = -2x^2 - 12x - 13$ ?

**A.** Shift left 3 units, stretch horizontally by a factor of 2, reflect through the $y$-axis, and shift down 5 units

**B.** Shift right 3 units, stretch horizontally by a factor of 2, reflect through the $y$-axis, and shift down 5 units

**C.** Shift left 3 units, stretch vertically by a factor of 2, reflect through the $x$-axis, and shift up 5 units

**D.** Shift right 3 units, stretch vertically by a factor of 2, reflect through the $x$-axis, and shift down 5 units

**9)** The equation $\frac{(x-4)^2}{c^2}+\frac{(y-6)^2}{d^2}=36$ describes an ellipse with the center at (4,6), a vertical major axis with a length of 6, and a horizontal minor axis with a length of 4. What are the values of $c$ and $d$ ?

**A.** $c=2$ and $d=3$

**B.** $c=3$ and $d=2$

**C.** $c=\frac{1}{2}$ and $d=\frac{1}{3}$

**D.** $c=\frac{1}{3}$ and $d=\frac{1}{2}$

**10)** How many real zeros does $h(t)$ have?

$$h(t)=4t^3-2t^2+t-10$$

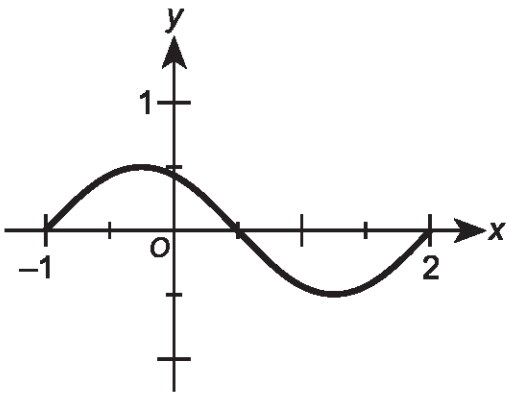
**A.** 3

**B.** 2

**C.** 1

**D.** 0

**11)** Which best describes the range of this graph of the relation $y = f(x)$ ?




**A.** $-1 \le x \le 2$

**B.** $-\frac{1}{2} \le x \le \frac{1}{2}$

**C.** $-1 \le y \le 2$

**D.** $-\frac{1}{2} \le y \le \frac{1}{2}$

**12)** In a geometric sequence where $a_1 = 15$ and $a_5 = 240$, what is the first term in the sequence that is a multiple of 4 ?

**A.** $a_2 = 20$

**B.** $a_3 = 60$

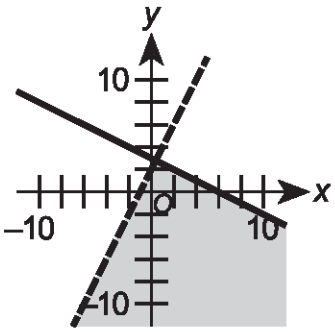
**C.** $a_4 = 60$

**D.** $a_4 = 120$

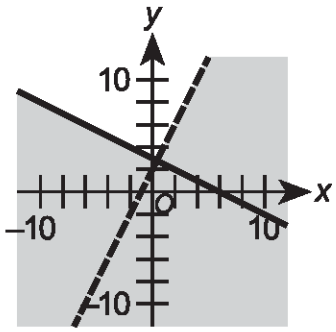
**13)** Which graph represents the solution set of this system of inequalities?

$$\begin{cases} x + 2y \le 6 \\ 2x - y < -2 \end{cases}$$

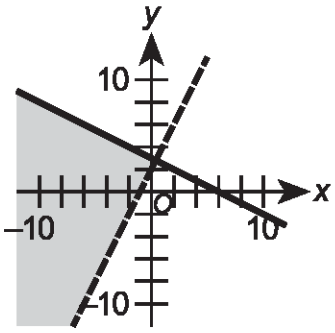
**A.**



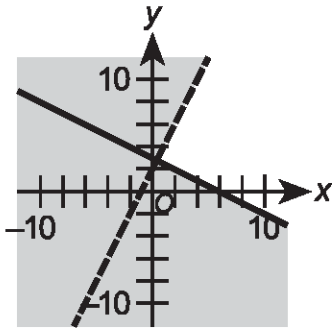

**C.**




**B.**




**D.**




**14)** In a given geometric sequence with $n$ terms, 2 and 8 are the 2nd and 6th terms, respectively. What is the value of $n$ if $32\sqrt{2}$ is the last term of the sequence?

**A.** 8

**B.** 9

**C.** 10

**D.** 11

**15)** Which of the following lists best describes the five complex zeros of the function $2x^5 + 3x^4 + 11x^3 + 24x^2 - 63x - 27$ ?

**A.** Three rational, two nonreal

**B.** Two rational, one irrational, two nonreal

**C.** One rational, two irrational, two nonreal

**D.** One rational triple root, two irrational

**16)** What is the solution set for $|2x + 9| \geq 3$ ?

**A.** $[3,\infty)$

**B.** $(-\infty,-6] \cup [-3, \infty)$

**C.** $(-\infty,3] \cup [6, \infty)$

**D.** $[-6,-3]$

**17)** At a hot dog eating contest, Kyra can steadily eat a hot dog every 15 seconds. Alan is a little slower; at his steady pace, he can eat one every 18 seconds. How long will it take the team of Kyra and Alan to polish off a plate of 22 hot dogs?

**A.** 2 min

**B.** 2 min 30 sec

**C.** 3 min

**D.** 3 min 30 sec

**18)** Consider the functions $f(x) = 3\sqrt{\frac{x}{2}}$ and $g(x) = 4x^2$.
Find and simplify $(g \circ f)(x)$ for $x > 0$.

**A.** $\frac{4}{3}\sqrt{\frac{x^3}{8}}$

**B.** $3\sqrt{2}x$

**C.** $12x^2\sqrt{\frac{x}{2}}$

**D.** $18x$

**19)** What is the standard form of the equation $25x^2 + y^2 + 100x - 2y + 76 = 0$ ?

**A.** $(x+2)^2 + \frac{(y-1)^2}{5} = 1$

**B.** $(x+2)^2 + \frac{(y+1)^2}{5} = 1$

**C.** $(x+2)^2 + \frac{(y-1)^2}{25} = 1$

**D.** $(x+2)^2 + \frac{(y+1)^2}{25} = 1$

**20)** Let $m$ and $n$ be real numbers. Find the real and imaginary parts of $(3 + mi)(n - 2i)$.

**A.** Real: $(3n - 2m)$; Imaginary: $(6 - mn)i$

**B.** Real: $(3n - 2m)$; Imaginary: $(mn - 6)i$

**C.** Real: $(3n + 2m)$; Imaginary: $(mn - 6)i$

**D.** Real: $3n$; Imaginary: $2mi$

QualityCore™

# Reference Sheet for the QualityCore™ **Algebra II End-of-Course Assessment**

## Equations of a Line

| | | |
|---|---|---|
| Standard Form | $Ax + By = C$ | $A$, $B$, and $C$ are constants with $A$ and $B$ not both equal to zero. |
| Slope-Intercept Form | $y = mx + b$ | $(x_1,y_1)$ is a point.<br>$m$ = slope<br>$b$ = $y$-intercept |
| Point-Slope Form | $y - y_1 = m(x - x_1)$ | |

## Quadratics

| | | |
|---|---|---|
| Standard Form of a Quadratic Equation | $ax^2 + bx + c = 0$ | $a$, $b$, and $c$ are constants, where $a \neq 0$. |
| Quadratic Formula | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ | |

## Conic Sections

| | | | |
|---|---|---|---|
| Circle | $(x - h)^2 + (y - k)^2 = r^2$ | center $(h,k)$<br>$r$ = radius | |
| Parabola | $y = a(x - h)^2 + k$ | axis of symmetry $x = h$<br>directrix $y = k - \frac{1}{4a}$ | vertex $(h,k)$<br>focus $\left(h, k + \frac{1}{4a}\right)$ |
| Parabola | $x = a(y - k)^2 + h$ | axis of symmetry $y = k$<br>directrix $x = h - \frac{1}{4a}$ | vertex $(h,k)$<br>focus $\left(h + \frac{1}{4a}, k\right)$ |
| Ellipse | $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ | foci $(h \pm c, k)$ where $c^2 = a^2 - b^2$, center $(h,k)$ | |
| Ellipse | $\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$ | foci $(h, k \pm c)$ where $c^2 = a^2 - b^2$, center $(h,k)$ | |
| Hyperbola | $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ | foci $(h \pm c, k)$ where $c^2 = a^2 + b^2$, center $(h,k)$ | |
| Hyperbola | $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$ | foci $(h, k \pm c)$ where $c^2 = a^2 + b^2$, center $(h,k)$ | |

## Lines and Points

| | | |
|---|---|---|
| Slope | $m = \frac{y_2 - y_1}{x_2 - x_1}$ | $(x_1,y_1)$ and $(x_2,y_2)$ are 2 points.<br>$m$ = slope<br>$M$ = midpoint<br>$d$ = distance |
| Midpoint | $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ | |
| Distance | $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ | |

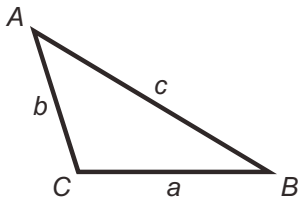
*continued*

## Miscellaneous

| | | |
|---|---|---|
| Distance, Rate, Time | $D = rt$ | $D$ = distance<br>$r$ = rate<br>$t$ = time<br>$I$ = interest<br>$p$ = principal<br>$A$ = amount of money after $t$ years<br>$n$ = number of times interest is compounded annually |
| Simple Interest | $I = prt$ | |
| Compound Interest | $A = p\left(1 + \frac{r}{n}\right)^{nt}$ | |
| Pythagorean Theorem | $a^2 + b^2 = c^2$ | $a$ and $b$ = legs of right triangle<br>$c$ = hypotenuse |

## Laws of Sines and Cosines

| | |
|---|---|
| Law of Sines | $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ |
| Law of Cosines | $a^2 = b^2 + c^2 - 2bc \cos A$ |




## Sequences, Series, and Counting

| | | |
|---|---|---|
| Arithmetic Sequence | $a_n = a_1 + (n - 1)d$ | $a_n = n^{\text{th}}$ term<br>$n$ = number of the term<br>$d$ = common difference<br>$s_n$ = sum of the first $n$ terms<br>$r$ = common ratio<br>$k$ = number of objects in the set<br>$m$ = number of objects selected |
| Arithmetic Series | $s_n = \frac{n}{2}(a_1 + a_n)$ | |
| Geometric Sequence | $a_n = a_1(r^{n-1})$ | |
| Geometric Series | $s_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$ | |
| Combinations | ${}_kC_m = C(k,m) = \frac{k!}{(k-m)!\,m!}$ | |
| Permutations | ${}_kP_m = P(k,m) = \frac{k!}{(k-m)!}$ | |

## Circumference, Area, and Volume

| | | |
|---|---|---|
| Triangle | $A = \frac{1}{2}bh$ | $A$ = area<br>$b$ = base<br>$h$ = height<br>$r$ = radius<br>$C$ = circumference<br>$d$ = diameter<br>$V$ = volume<br>$B$ = area of base<br>$\pi \approx 3.14$ |
| Parallelogram | $A = bh$ | |
| Trapezoid | $A = \frac{1}{2}(b_1 + b_2)h$ | |
| Circle | $A = \pi r^2$<br>$C = \pi d$ | |
| General Prism | $V = Bh$ | |
| Right Circular Cylinder | $V = \pi r^2 h$ | |
| Pyramid | $V = \frac{1}{3}Bh$ | |
| Right Circular Cone | $V = \frac{1}{3}\pi r^2 h$ | |
| Sphere | $V = \frac{4}{3}\pi r^3$ | |

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# Answer Key

1) B
2) C
3) A
4) A
5) C
6) B
7) A
8) C
9) D
10) C
11) D
12) B
13) B
14) D
15) C
16) B
17) C
18) D
19) C
20) C