Wizard Test Maker

ALGEBRA II

QUESTION CATALOGUE

eduware

Algebra II and Trigonometry

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5613. Indicate whether each statement below is true and explain why, using mathematical language.
a. All natural numbers are integers.
b. All real numbers are irrational.
c. All natural numbers are rational numbers.

_a._ True
_b._ False
_c._ True

5612. Indicate whether each statement below is true or false.
I. $(a + b) + c = a + (b + c)$
II. $(a - b) - c = a - (b - c)$
III. $(ab)c = a(bc)$

I. True II. False III. True

1771. Which field property is illustrated by the expression $\sin x(\cos x + 1) = \sin x \cos x + \sin x$?
1) associative property
2) commutative property
3) inverse property
4) distributive property of multiplication over addition

673. Which equation is an illustration of the additive identity property?
1) $x \bullet 1 = x$
3) $x - x = 0$
2) $x + 0 = x$
4) $x \bullet \frac{1}{x} = 1$

659. Which equation illustrates the multiplicative inverse property?
1) $b \bullet 0 = 0$
2) $b + (-b) = 0$
3) $b + 0 = b$
4) $b \bullet \frac{1}{b} = 1$

646. Which statement is an illustration of the commutative property of real numbers?
1) $5 + 3 = 3 + 5$
2) $5(6 + 7) = 5(6) + 5(7)$
3) $\left(\frac{1}{2} + \frac{1}{3}\right) + \frac{1}{4} = \frac{1}{2} + \left(\frac{1}{3} + \frac{1}{4}\right)$
4) $-5 + 0 = -5$

585. Which equation illustrates the additive inverse property?
1) $a + (-a) = 0$
3) $a \div (-a) = -1$
2) $a + 0 = a$
4) $a \bullet \frac{1}{a} = 1$

527. In the set of rational numbers, what is the identity element for multiplication?

1

580. If x and y are any two whole numbers, which statements *always* true?
1) $xy = yx$
2) $\frac{x}{y} = \frac{y}{x}$
3) $x - y = y - x$
4) $x + 3y = y + 3x$

560. If a, b, and c are real numbers, which statement is always true?
1) $a \div b = b \div a$
2) $a(b + c) = (a + b) \times (a + c)$
3) $a(b \times c) = (a \times b)c$
4) $a \times 0 = a$

551. In the solution of this problem, which property of real numbers justifies statement 5?

Statements	Reasons
1. $3x = 6$	1. Given
2. $\frac{1}{3}(3x) = \frac{1}{3}(6)$	2. Multiplication axiom
3. $\left(\frac{1}{3} \cdot 3\right)x = 2$	3. Associative property
4. $1 \cdot x = 2$	4. Multiplicative inverse
5. $x = 2$	5. ______________

1) Closure
3) Commutative
2) Identity
4) Inverse

496. In the step-by-step simplification of the expression below, which property is *not* used?

$3(1 + x)$
$3(x + 1)$
$3 \cdot x + 3 \cdot 1$
$3x + 3$

1) associative
3) distributive
2) commutative
4) identity

477. Which is an illustration of the associative property?
1) $ab = ba$
3) $a(bc) = (ab)c$
2) $a(b + c) = ab + ac$
4) $a + 0 = a$

457. If a and b are any two whole numbers, which statement is always true?
1) $2a + b = 2b + a$
3) $a^b = b^a$
2) $a + b = b + a$
4) $a \div b = b \div a$

424. Which is an illustration of the associative property?
1) $a \cdot b = b \cdot a$
3) $a \cdot b = a$
2) $a \cdot (b \cdot c) = (b \cdot c) \cdot a$
4) $a \cdot (b \cdot c) = (a \cdot b) \cdot c$

5339. A company determines its profit, P, by finding the difference between its revenue, R, and its costs, C. The cost of producing their product is given by $C = 30x + 5$, and the revenue from selling the product is given by $R = 45x$, where x is the amount of the product sold. How much must the company sell so that their profits are $385.

26

5336. A company calculates its profit by finding the difference between revenue and cost. The cost function of producing x hammers is $C(x) = 4x + 170$. If each hammer is sold for $10, the revenue function for selling x hammers is $R(x) = 10x$.

How many hammers must be sold to make a profit?
How many hammers must be sold to make a profit of $100?

29 hammers to make a profit and 45 hammers to make a profit of $100.

5335. The revenue, $R(x)$, from selling x units of a computer is represented by the equation $R(x) = 50x$, while the total cost, $C(x)$, of making x computers is represented by the equation $C(x) = 15x – 11$. The total profit, $P(x)$, is represented by the equation $P(x) = R(x) – C(x)$. For $R(x)$ and $C(x)$ given above, what is $P(x)$?

1) $35x$
2) $35x – 11$
3) $35x + 11$
4) $65x – 11$

5334. The cost (C) of selling x watches in a store is modeled by the equation $C = \frac{1,800,000}{x} + 64,500$. The store profit (P) for these sales is modeled by the equation $P = 300x$. What is the minimum number of watches that must be sold for profit to be greater than cost?

241

5333. The cost (C) of selling x calculators in a store is modeled by the equation $C = \frac{3,200,00}{x} + 60,000$. The store profit ($P$) for these sales is modeled by the equation $P = 500x$. What is the minimum number of calculators that have to be sold for profit to be greater than cost?

$161,500x > \frac{3,200,000}{x} + 60,000$

5332. A new shoe store was just opened up. The cost of opening the store is represented by the equation, $C(x)= 36x + 1,500$, where x represents the number of pairs of shoes they start with. The revenue obtained by selling x pairs of shoes is represented by the equation, $R(x)= 42x$. The total profit earned by the shoe store is represented by they equation, $P(x)= R(x) – C(x)$. For the values of $R(x)$ and $C(x)$ given above, what is $P(x)$?

1) $6x + 1,500$
2) $–6x – 1,500$
3) $6x – 1,500$
4) $–6x + 1,500$

2689. A store advertises that during its Labor Day sale $15 will be deducted from every purchase over $100. In addition, after the deduction is taken, the store offers an early-bird discount of 20% to any person who makes a purchase before 10 a.m. If Hakeem makes a purchase of x dollars, $x > 100$, at 8 a.m., what, in terms of x, is the cost of Hakeem's purchase?

1) $0.20x – 15$
2) $0.20x – 3$
3) $0.85x – 20$
4) $0.80x – 12$

5331. The revenue, $R(x)$, from selling x units of a product is represented by the equation $R(x) = 35x$, while the total cost, $C(x)$, of making x units of the product is represented by the equation $C(x) = 20x + 500$. The total profit, $P(x)$, is represented by the equation $P(x) = R(x) – C(x)$. For the values of $R(x)$ and $C(x)$ given above, what is $P(x)$?

1) $15x$
2) $15x + 500$
3) $15x – 500$
4) $10x + 100$

3155. Phone calls cost $.50 for the first minute and $.20 for every minute after the first up to 20 minutes. After the 20th minute, it costs $.10 for each additional minute. Give an expression for the cost of a phone call in terms of minutes, x, assuming the call is longer than 20 minutes.

$.50 + .20(x – 1) + .10(x – 20)$

3154. Phone calls cost $.50 for the first minute and $.20 for every minute after the first. Give an expression for the cost of a phone call in terms of minutes, x.

$.5 + .2(x – 1)$

3153. Give an expression for the profit generated by selling x widgets. Widgets are sold for $5 each. To manufacture widgets, it cost $500 plus $3 per widget.

1) $5x – 3x + 500$
2) $500 – 2x$
3) $5x – (3x + 500)$
4) $500 + 3x$

3152. A software company agrees to write a program for $5000 plus $75 for each copy. Express the total cost, $C(x)$, as a function of the number of copies x.

$C(x) = 5000 + 75x$

3145. The revenue, $R(x)$, from selling x units of sandwiches is given by $R(x) = 3x$, while the total cost, $C(x)$ of making x sandwiches is given by $C(x) = 2x + 20$. The total profit, $P(x)$, is given by $P(x) = R(x) – C(x)$. What is the profit is 20 sandwiches are sold?

$ 0

3144. A store is having a Fourth of July Sale in which they offer $7.40 off of any purchase over $50 and an additional 26% off if the purchase is made before 12 noon. If a customer spends x, $x > 50$, during the morning, what, in terms of x, is the cost?

$.74x – 7.4$

3142. The cost of renting a moving truck is determined by a flat fee for the first 3 hours and a fixed amount per each additional hour. If a 4 hour rental costs $73 and a 7 hour rental costs $142, what is the cost of a 5 hour rental?

$96

1582. Solve for y in terms of a, b, and c:

$$ay – 2c = b$$

$\frac{b + 2c}{a}$

1391. If the sum of a number n and ten times its reciprocal is 7, then a value of n may be

1) $\frac{1}{2}$
2) 2
3) 3
4) 4

3123. Three runners are in a relay. The first runner runs $\frac{4}{x}$, the second runner runs $5x$, and the third runner runs $\frac{2x+2}{x^2}$. How much more did the third runner run than the first two combined?

$\frac{2-5x^3-2x}{x^2}$

2928. Perform the indicated operation and simplify:

$$\frac{x^2-x-6}{3x^2-10x+3} \bullet \frac{4x^2-7x-2}{x^2-4}$$

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

2924. When $\frac{x+4}{2}$ is divided by $\frac{x^2-16}{8}$, the quotient is

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

2859. Express in simplest form:

$$\frac{36-x^2}{x^2+8x+12} \div \frac{x^2-6x}{x-2}$$

$\frac{-(x-2)}{x(x+2)}$

2838. Express in simplest form:

$$\frac{4x^2-100}{x^2+x-6} \div \frac{20-4x}{2x^2-9x+10}$$

$\frac{-(2x-5)(x+5)}{x+3}$

2783. For all values of x for which the expression is defined:

Simplify completely: $\frac{x^2-9}{2x^2} \bullet \frac{6x}{9-3x}$

$-\frac{x+3}{x}$

2769. For all values of x for which the expressions are defined, express the quotient in simplest form:

$$\frac{x^2-9}{x^2-5x} \div \frac{x^2-x-12}{2x^2-10x}$$

$\frac{2(x-3)}{x-4}$

2725. For all values of k for which these expressions are defined, express the product in simplest form:

$$\frac{3k^3-27k}{k^2+4k+3} \bullet \frac{k^2+k}{6k^3}$$

$\frac{k-3}{2k}$

2705. If the length of a rectangular garden is represented by $\frac{x^2+2x}{x^2+2x-15}$ and its width is represented by $\frac{2x-6}{2x+4}$, which expression represents the area of the garden?

1) x
2) $x+5$
3) $\frac{x^2+2x}{2(x+5)}$
4) $\frac{x}{x+5}$

2633. Express in simplest form:

$$\frac{x^2-9}{2x-8} \div \frac{3-x}{x-4}$$

$\frac{-(x+3)}{2}$

2616. Express the quotient in simplest form:

$$\frac{x^2-12x+36}{x-6} \div \frac{x^2-36}{6}$$

$\frac{6}{x+6}$

2601. Simplify: $\frac{x^2-36}{5x-30} \div \frac{5x+30}{10}$

$\frac{2}{5}$

1994. Perform the indicated operations and express in lowest terms:

$$\frac{x^2-9}{2x+4} \bullet \frac{x^2+7x+10}{x^2-3x-18} \div \frac{x^2+2x-15}{2x^2-12x}$$

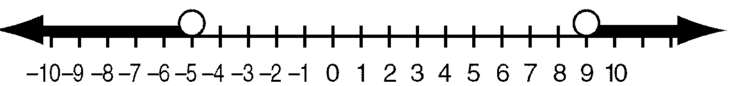
x

4916. What is the solution of the inequality $|2x - 5| < 1$?
1) $x < 3$
2) $2 < x < 3$
3) $x > -3$
4) $x \leq 2$ or $x \geq 3$

4864. Which value of a does *not* satisfy the inequality $|a| > 2a - 3$?
1) -1
2) 0
3) 3
4) -5

3437. What is the solution set of the inequality $|2x - 1| < 9$?
1) $\{x \mid -4 < x < 5\}$
2) $\{x \mid x < -4 \text{ or } x > 5\}$
3) $\{x \mid x < 5\}$
4) $\{x \mid x < -4\}$

3287. The solution set of which inequality is represented by the accompanying graph?



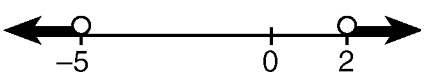
1) $|x - 2| > 7$
2) $|x - 2| < 7$
3) $|2 - x| > -7$
4) $|2 - x| < -7$

3269. What is the solution of the inequality $|y + 8| > 3$?
1) $y > -5$ or $y < -11$
2) $y > -5$
3) $-11 < y < -5$
4) $-5 < y < 11$

3221. The solution of $|2x - 3| < 5$
1) $x < -1$ or $x > 4$
2) $-1 < x < 4$
3) $x > -1$
4) $x < 4$

3201. Which graph represents the solution set for the expression $|2x + 3| > 7$?

1)


2)


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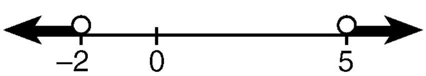


4)


3199. The heights, h, of the students in the chorus at Central Middle School satisfy the following inequality.

$$\left|\frac{h - 57.5}{2}\right| \leq 3.25$$

Determine the interval in which these heights lie and express your answer to the nearest tenth of a foot.

4.3 – 5.3

2998. What is the solution set of the inequality $|3 - 2x| \geq 4$?
1) $\{|\frac{7}{2} \leq x \leq -\frac{1}{2}\}$
2) $\{|-\frac{1}{2} \leq x \leq \frac{7}{2}\}$
3) $\{x|x \leq -\frac{1}{2}$ or $x \geq \frac{7}{2}\}$
4) $\{x|x \leq \frac{7}{2}$ or $x \geq -\frac{1}{2}\}$

2972. What is the solution set of $|4x + 8| > 16$?
1) $\{x \mid -6 < x < 2\}$
2) $\{x \mid -2 < x < 6\}$
3) $\{x \mid x < -6 \text{ or } x > 2\}$
4) $\{x \mid x < -2 \text{ or } x > 6\}$

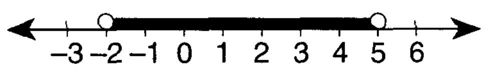
2911. The inequality $|1.5C - 24| \leq 30$ represents the range of monthly average temperatures, C, in degrees Celsius, for Toledo, Ohio. Solve for C.

$-4 \leq C \leq 36$

2698. The solution set of $|3x + 2| < 1$ contains
1) only negative real numbers
2) only positive real numbers
3) both positive and negative real numbers
4) no real numbers

2685. Which equation states that the temperature, t, in a room is less than 3° from 68°?
1) $|3 - t| < 68$
2) $|3 + t| < 68$
3) $|68 - t| < -3$
4) $|68 + t| < -3$

2629. Which graph represents the solution to the inequality $|3 - 2x| > 7$?

1)


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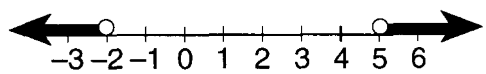

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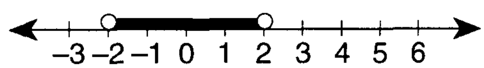
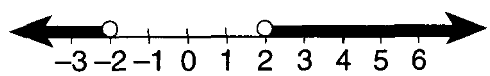


4)


1959. If $|2x + 3| < 1$, then the solution set contains
1) only negative real numbers
2) only positive real numbers
3) both positive and negative real numbers
4) no real numbers

1929. What is the solution set of the inequality $|3x + 6| \leq 30$?
1) $\{-12 \leq x \leq 8\}$
2) $\{-8 \leq x \leq 12\}$
3) $\{x \leq -12 \text{ or } x \geq 8\}$
4) $\{x \leq -8 \text{ or } x \geq 12\}$

1916. The solution set of $|x - 3| > 5$ is
1) $\{x < 8 \text{ and } x < -2\}$
2) $\{x < 8 \text{ or } x < -2\}$
3) $\{x < 8 \text{ and } x > -2\}$
4) $\{x > 8 \text{ or } x < -2\}$

3130. What is the area of a triangle with a base of $\frac{1}{2+\sqrt{7}}$ and a base of $3-\sqrt{7}$ in simplest form?

$\frac{-13+5\sqrt{7}}{10}$

3022. The expression $\frac{7}{2-\sqrt{3}}$ is equivalent to

1) $14-7\sqrt{3}$
2) $14+7\sqrt{3}$
3) $\frac{2+\sqrt{3}}{7}$
4) $\frac{14+\sqrt{3}}{7}$

3010. Which expression is equal to $\frac{2+\sqrt{3}}{2-\sqrt{3}}$?

1) $\frac{1-4\sqrt{3}}{7}$
2) $\frac{7+4\sqrt{3}}{7}$
3) $1-4\sqrt{3}$
4) $7+4\sqrt{3}$

2991. Which expression is equivalent to $\frac{4}{3+\sqrt{2}}$?

1) $\frac{12+4\sqrt{2}}{7}$
2) $\frac{12+4\sqrt{2}}{11}$
3) $\frac{12-4\sqrt{2}}{7}$
4) $\frac{12-4\sqrt{2}}{11}$

2957. The expression $\frac{7}{2+3\sqrt{2}}$ is equivalent to

1) $\frac{-2+3\sqrt{2}}{2}$
2) $\frac{2-3\sqrt{2}}{2}$
3) $-2+3\sqrt{2}$
4) $2-3\sqrt{2}$

2849. The expression $\frac{2}{\sqrt{3}+1}$ is equivalent to

1) $\frac{\sqrt{3}}{2}$
2) $\frac{2\sqrt{3}+2}{4}$
3) $\sqrt{3}-1$
4) $1-\sqrt{3}$

2830. The expression $\frac{\sqrt{x}}{\sqrt{x}-1}$ is equivalent to

1) $x+\sqrt{x}$
2) $\frac{x+\sqrt{x}}{x-1}$
3) $\frac{\sqrt{x}-1}{x}$
4) $1-\sqrt{x}$

1837. The expression $\frac{2+\sqrt{3}}{2-\sqrt{3}}$ is equivalent to

1) $11\sqrt{3}$
2) $7-4\sqrt{3}$
3) $7+4\sqrt{3}$
4) $\frac{7+4\sqrt{3}}{7}$

1826. The expression $\frac{\sqrt{3}+1}{\sqrt{3}-1}$ is equal to

1) -1
2) 2
3) $2+\sqrt{3}$
4) $5+\sqrt{3}$

1808. Express an equivalent fraction with a rational denominator with the fraction below.

$$\frac{5}{4-\sqrt{13}}$$

$\frac{5(4+\sqrt{13})}{3}$

1802. Simplify:

$$\frac{1-\frac{3}{\cos x}}{\frac{9}{\cos^2 x}-1}$$

$\frac{-\cos x}{3+\cos x}$

1786. Expressed in simplest form, $\frac{2\sqrt{3}}{1-\sqrt{3}}$ is equivalent to

1) $-3-\sqrt{3}$
2) $-3+\sqrt{3}$
3) $2\sqrt{3}$
4) -3

1673. Express $\frac{3}{5-2\sqrt{3}}$ as a fraction with a rational denominator.

$\frac{3(5+2\sqrt{3})}{13}$

5919. The roots of the equation $2x^2 + 7x - 3 = 0$ are
1) $-\frac{1}{2}$ and -3
2) $\frac{1}{2}$ and 3
3) $\mathbf{\frac{-7 \pm \sqrt{73}}{4}}$
4) $\frac{7 \pm \sqrt{73}}{4}$

5839. The solutions of the equation $y^2 - 3y = 9$ are
1) $\frac{3 \pm 3i\sqrt{3}}{2}$
2) $\frac{3 \pm 3i\sqrt{5}}{2}$
3) $\frac{-3 \pm 3i\sqrt{5}}{2}$
4) $\mathbf{\frac{3 \pm 3\sqrt{5}}{2}}$

5838. The solutions of the equation $y^2 - 3y = 9$ are
1) $\frac{3 \pm 3i\sqrt{3}}{2}$
2) $\frac{3 \pm 3i\sqrt{5}}{2}$
3) $\frac{-3 \pm 3i\sqrt{5}}{2}$
4) $\frac{3 \pm 3\sqrt{5}}{2}$

4967. Find the roots of the equation $x^2 + 7 = 2x$ and express your answer in simplest $a + bi$ form.
$1 \pm i\sqrt{6}$

3277. In physics class, Taras discovers that the behavior of electrical power, x, in a particular circuit can be represented by the function $f(x) = x^2 + 2x + 7$. If $f(x) = 0$, solve the equation and express your answer in simplest $a + bi$ form.
$-1 \pm i\sqrt{6}$

3019. Express, in simplest $a + bi$ form, the roots of the equation $x^2 + 5 = 4x$.
$2 \pm i$

2962. Express the roots of the equation $x^2 + 1 = 4(x - 1)$ in simplest $a + bi$ form.
$2 \pm i$

2927. *a* Sketch the graph of the equation $y = x^2 - 6x + 4$ for all values of x in the interval $0 \le x \le 6$.
b Find the roots of the equation $x^2 - 6x + 4 = 0$ to the *nearest hundredth*.
***a* Graph**
***b* 0.76, 5.24**

2921. What are the roots of the equation $x^2 - 5x - 2 = 0$?
1) $\frac{5 \pm \sqrt{17}}{2}$
3) $\frac{5 \pm \sqrt{33}}{2}$
2) $\frac{-5 \pm \sqrt{17}}{2}$
4) $\frac{-5 \pm \sqrt{33}}{2}$

2856. Solve for x and express your answer in simplest $a + bi$ form:
$$x^2 + 29 = 4x$$
$2 \pm 5i$

2820. Solve for x and express the roots in simplest $a + bi$ form:
$$x + \frac{5}{x} = 2$$
$1 \pm 2i$

2784. *a* Sketch the graph of the equation $y = x^2 - 8x + 15$ for all values of x in the interval $1 \le x \le 7$.
b Find the roots of the equation $x^2 - 8x + 15 = 0$.
c Find the number of points of intersection of the graphs of the equations $y = x^2 - 8x + 15$ and $y = -2$.
***b* 3,5**
***c* 0**

2781. What are the roots of the equation $3x^2 - 6x - 2 = 0$?
1) $1 \pm \sqrt{12}$
2) $\mathbf{6 \pm \sqrt{10}}$
3) $\frac{6 \pm \sqrt{60}}{6}$
4) $\frac{6 \pm \sqrt{12}}{6}$

2717. If $(x - 3)^2 = 5$, then x is equal to
1) $\mathbf{3 \pm \sqrt{5}}$
2) $-3 \pm \sqrt{5}$
3) $\sqrt{-5} \pm 3$
4) $\frac{\pm\sqrt{5}}{3}$

2697. A homeowner wants to increase the size of a rectangular deck that now measures 15 feet by 20 feet, but building code laws state that a homeowner cannot have a deck larger than 900 square feet. If the length and the width are to be increased by the same amount, find, to the *nearest tenth*, the maximum number of feet that the length of the deck may be increased in size legally.
12.6

2654. Express the roots of the equation $9x^2 = 2(3x - 1)$ in simplest $a + bi$ form.
$\frac{1}{3} \pm \frac{i}{3}$

5884. The graph of the product of $(4 + 3i)$ and $(2 - 3i)$ lies in which quadrant?
1) I
2) II
3) III
4) IV

4890. The expression $\frac{10}{3+i}$ is equivalent to
1) $3 - i$
2) $3 + i$
3) $\frac{15+15i}{4}$
4) $\frac{5}{4}$

3206. The expression $\frac{2+i}{3+i}$ is equivalent to
1) $\frac{6+5i}{8}$
2) $\frac{6+i}{8}$
3) $\frac{7-5i}{10}$
4) $\frac{7+i}{10}$

3191.
$$\frac{i^{16}}{i^3}$$
The expression above is equivalent to
1) 1
2) -1
3) i
4) $-i$

3113. Mary and Pablo are playing a game with complex numbers. Mary has a score of $3 + 2i$. What must Pablo's score be so that the produce of their score is one?
1) $-3 - 2i$
2) $3 - 2i$
3) $\frac{-3-2i}{13}$
4) $\frac{3-2i}{13}$

3103. Mary and Pablo are playing a game with complex numbers. Mary has a score of $3 + 2i$. What must Pablo's score be so that the produce of their score is one?
1) $-3 - 2i$
2) $3 - 2i$
3) $\frac{-3-2i}{13}$
4) $\frac{3-2i}{13}$

3100. What is the area of an imaginary triangle with a height of 2 and base of $2 + 4i$?
1) $2 + 4i$
2) $4 + 6i$
3) $4 + 8i$
4) 8

3098. What is the area of an imaginary rectangle with sides of $2 + 2i$ and $3i$?
1) $6 + 6i$
2) $-6 - 6i$
3) $6 - 6i$
4) $-6 + 6i$

3011. What is the product of $5 + \sqrt{-36}$ and $1 - \sqrt{-49}$, expressed in simplest $a + bi$ form?
1) $-37 + 41i$
2) $5 - 71i$
3) $47 + 41i$
4) $47 - 29i$

3096. Bill and Melanie are partners playing a game with complex numbers. Your team's score is equal to the product of your score and your partner's score. Bill has a score of $3 + 7i$, and Melanie has a score of $3 - 7i$. What is their team score?
1) -40
2) $-40 - 7i$
3) 58
4) $58 + 49i$

2990. The relationship between voltage, E, current, I, and resistance, Z, is given by the equation $E = IZ$. If a circuit has a current $I = 3 + 2i$ and a resistance $Z = 2 - i$, what is the voltage of this circuit?
1) $8 + i$
2) $8 + 7i$
3) $4 + i$
4) $4 - i$

2910. In an electrical circuit, the voltage, E, in volts, the current, I, in amps, and the opposition to the flow of current, called impedance, Z, in ohms, are related by the equation $E = IZ$. A circuit has a current of $(3 + i)$ amps and an impedance of $(-2 + i)$ ohms. Determine the voltage in $a + bi$ form.

$-7 + i$

2800. The expression $(i^3 - 1)(i^3 + 1)$ is equivalent to
1) -2
2) $2i - 1$
3) $2i + 1$
4) $-2i$

2671. Where i is the imaginary unit, expand and simplify completely $(3 - i)^4$.

$28 - 96i$

2628. The expression $\frac{5}{4+3i}$ is equivalent to
1) $\frac{4-3i}{5}$
2) $\frac{4+3i}{5}$
3) $\frac{20+15i}{7}$
4) $\frac{20-15i}{7}$

1974. The expression $i^2(2 - i)$ is equivalent to
1) $-2 - i$
2) $-2 + i$
3) $2 - i$
4) $2 + i$

1961. The value of $(1 - i)^2$ is
1) 0
2) 2
3) $-2i$
4) $2 - 2i$

1914. Express the product of $4 - 3i$ and $2 + i$ in simplest $a + bi$ form.

$11 - 2i$

1905. The product of $5 - 2i$ and i is
1) 7
2) $2 + 5i$
3) $5 - 2i$
4) $-2 + 5i$

3294. Solve the following system of equations algebraically:

$9x^2 + y^2 = 9$
$3x - y = 3$

(0,–3) and (1,0)

5925. Which values of x are in the solution set of the following system of equations?

$$y = 3x - 6$$
$$y = x^2 - x - 6$$

1) 0, –4
2) 0, 4
3) 6, –2
4) –6, 2

5890. Solve the following system of equations algebraically.

$x^2 - 2y^2 = 23$
$x - 2y = 7$

x=5,y=-1 AND x=-19, y=-13

(5,-1) and (-19,-13)

3136. A ball is thrown and moves by the equation $y = 10 - x^2$. A second ball launched so that it initially moves according to the equation $y = 3x$. If the y coordinate of the point of intersection is 6, what is the value of x when they intersect?

1) 1
2) 2
3) 3
4) 4

3061. Two runners begin a race from the same point. The first moves according to the equation $y = 3x^2$, and the second moves according to the equation $y = 5x$, where y is the distance in meters from the starting point and x is the time in seconds. At what time after the start of the race does the first runner lead by 12 meters?

3 s

3060. Two cars travel next to each other on a straight track, starting from the same point. The first car moves according to the equation $y = 5x^2$, and the second car moves according to the equation $y = 10x$, where y is the distance from the starting point in meters and x is the time in seconds. What is the first time after 0 that the cars are the same distance from the starting point?

2 s

3059. A submarines are traveling through a coordinate grid in the ocean. They travel at different depths but one starts directly below the other. The first submarine travels according to the equation $y = x^2 - 2x + 1$, and the second submarine travels according to the equation $y = x$. At how many points is one submarine directly above the other?

2

3058. Two spaceships are traveling through a coordinate grid in space. The first spaceship moves according to the equation $y = x^2 + 9$, and the second spaceship moves according to the equation $y = 6x$. At what point does their motion intersect?

1) (18, 3)
2) (3, 18)
3) (6, 3)
4) (3, 6)

2779. Which ordered pair is a solution for the system of equations $y = \frac{1}{2}x + 1$ and $y = x^2 - 4x + 3$?

1) $(\frac{1}{2},4)$
2) (4,3)
3) (–4,–1)
4) (–4,3)

2766. Solve the following system of equations algebraically or graphically and check:

$y = 2x^2 - 4x + 1$
$y + 2x = 5$

(–1,7), (2,1)
Check

2719. What is a solution for the system of equations $y = x^2 + 4$ and $y = x + 4$?

1) (2,8)
2) (0,4)
3) (–1,3)
4) (–2,8)

2677. What is the total number of points of intersection in the graphs of the equations $x^2 + y^2 = 16$ and $y = 4$?

1) 1
2) 2
3) 3
4) 0

2613. Solve the following system of equations graphically or algebraically and check:

$y = -2x^2 - 4x + 2$
$2x = y - 2$

(0,2), (–3,–4)
Check

2612. Which statement describes the graphs of the equations $x = -1$ and $x^2 + y^2 = 4$?

1) They do not intersect.
2) They intersect in the second quadrant, only.
3) They intersect in the third quadrant, only.
4) They intersect in the second and in the third quadrants.

916. If the graphs of the equations y = x + 2 and $y = x^2 - 3x + 6$ are drawn on the same set of axes, at which point will the graphs intersect?

1) (–2,0)
2) (1,3)
3) (1,4)
4) (2,4)

3322. Find the product AB where

$$A = \begin{bmatrix} 2 & 6 \\ -3 & 4 \\ 0 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$$

1) $\begin{bmatrix} 28 & 28 \\ -3 & 10 \\ 6 & 8 \end{bmatrix}$

3) $\begin{bmatrix} 20 & 28 \\ -4 & -3 \\ 4 & 6 \end{bmatrix}$

2) $\begin{bmatrix} 28 & 36 \\ 10 & 11 \\ 8 & 10 \end{bmatrix}$

4) $\begin{bmatrix} 36 & 20 \\ 11 & -4 \\ 10 & 4 \end{bmatrix}$

3261. The Factorization Principle for real numbers states that if $ab = 0$, then either $a = 0$ or $b = 0$. This is not necessarily the case when multiplying two matrices. If

$$A = \begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix},$$

then which nonzero matrix B demonstrates that the product AB equals a zero matrix?

1) $B = \begin{bmatrix} 4 & 3 \\ -8 & -6 \end{bmatrix}$

3) $B = \begin{bmatrix} 6 & 9 \\ -2 & 3 \end{bmatrix}$

2) $B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

4) $B = \begin{bmatrix} 3 & -4 \\ -9 & 12 \end{bmatrix}$

3260. $B = \begin{bmatrix} 2 & 0 & -4 \\ -5 & 1 & 0 \end{bmatrix}$

Which matrix correctly shows B^2?

1) $\begin{bmatrix} 20 & -10 \\ -10 & 26 \end{bmatrix}$

3) $\begin{bmatrix} 29 & -5 & -8 \\ -5 & 1 & 0 \\ -8 & 0 & 16 \end{bmatrix}$

2) $\begin{bmatrix} 4 & 0 & 16 \\ 25 & 1 & 0 \end{bmatrix}$

4) **B^2 is undefined.**

3259. $A = \begin{bmatrix} 2 & 3 \\ -2 & 4 \end{bmatrix}$

Which matrix correctly shows A^2?

1) $\begin{bmatrix} 4 & 6 \\ -4 & 8 \end{bmatrix}$

3) $\begin{bmatrix} -2 & 18 \\ -12 & 10 \end{bmatrix}$

2) $\begin{bmatrix} 4 & 9 \\ 4 & 16 \end{bmatrix}$

4) A^2 is undefined.

3255. Two teachers submit the number of supplies they will need during the year.

	Mrs. Roberts	Mrs. Jackson
Textbooks	30	25
Pencils	90	115
Erasers	5	4

If each textbook costs \$65, each pencil costs \$2, and each eraser costs \$5, which matrix equation correctly finds the total cost of supplies of each teacher?

1) $\begin{bmatrix} 30 & 25 \\ 90 & 115 \\ 5 & 4 \end{bmatrix} \begin{bmatrix} \$65 \\ \$2 \\ \$5 \end{bmatrix} = \begin{bmatrix} \$2155 & \$1875 \end{bmatrix}$

2) $\begin{bmatrix} 30 & 90 & 5 \\ 25 & 115 & 4 \end{bmatrix} \begin{bmatrix} \$65 & \$2 & \$5 \end{bmatrix} = \begin{bmatrix} \$2155 \\ \$1875 \end{bmatrix}$

3) $\begin{bmatrix} 30 & 90 & 5 \\ 25 & 115 & 4 \end{bmatrix} \begin{bmatrix} \$65 \\ \$2 \\ \$5 \end{bmatrix} = \begin{bmatrix} \$2155 \\ \$1875 \end{bmatrix}$

4) $\begin{bmatrix} 30 & 25 \\ 90 & 115 \\ 5 & 4 \end{bmatrix} \begin{bmatrix} \$65 & \$2 & \$5 \end{bmatrix} = \begin{bmatrix} \$2155 & \$1875 \end{bmatrix}$

3238. If the dimensions of matrix A are 3×2 and the dimensions of matrix B are 2×4, what are the dimensions of the product matrix $B \cdot A$?

1) 2×2
2) 3×4
3) 6×8
4) undefined

5592. Evaluate the expression below when $x = 6$

$$(x+3)^{\frac{1}{2}}+(x-3)^{0}+(x+2)^{-\frac{2}{3}}$$

$4\frac{1}{4}$ or 4.25

5100. The number of square feet of grass cut per day by a gardening service is given by the equation $g(x) = 30000 + 500x - 50x^2$ where x is the number of employees working that day. How many square feet of grass will be cut on Tuesday if there are 10 people working on Tuesday?

30000

5099. The kinetic energy (K) of an object is dependent on its mass (m) and velocity (v) and is given by the equation $K = .5mv^2$. If an object has a velocity of 5 and a kinetic energy of 75, what is its mass?

6

5098. The period, T, in seconds, of a mass-spring system is given by

$$T = 2\pi\sqrt{\frac{m}{10}},$$

where m is the mass in kg. What must the mass be, to the nearest kg, so that period is 12.5 seconds?

40

5096. The period of a pendulum (T), in seconds, is the length of time it takes for the pendulum to make one complete swing back and forth. The formula below gives the period T for a pendulum of length L in feet. If you want to build a grandfather clock with a pendulum that swings back and forth once every 3 seconds, how long *to the nearest tenth of a foot*, would you make the pendulum?

$$T = 2\pi\sqrt{\frac{L}{32}}$$

7.3

5094. Find f(–2) if

$$f(x) = \sqrt{29 - x^2}$$

5

5092. If $f(x) = 3x - 4$ and $g(x) = x^2$, find the value of $f(3) - g(2)$.

1

5091. If $g(x) = 36^x$, evaluate $g(-\frac{1}{2})$.

$.1\overline{6}$

5093. What is f(8) if

$$f(x) = x^{-\frac{2}{3}}$$

1) $\frac{-16}{3}$
2) -4
3) **$\frac{1}{4}$**
4) 4

5090. Find the value of the expression below when $x = 16$.

$$5x^0 + x^{-\frac{1}{2}} - x^{\frac{1}{2}}$$

$1\frac{1}{4}$

5089. If $f(x) = x^0 + x^{\frac{1}{2}} + x^{-1}$, find f(4).

$3\frac{1}{4}$

5085. If $f(x) = x^{\frac{1}{2}} + x^{-2}$ what is the value of f(4)?

$2\frac{1}{16}$

5081. Given: $f(x) = 11x + 3$ and $g(x) = \sqrt{x}$.
Find:
a f(2)
b g(f(2))
c g(100)
d $f^{-1}(x)$
e $g^{-1}(3)$

***a* 25 *b* 5 *c* 10 *d* $\frac{x-3}{11}$ *e* 9**

5079. If $f(x) = \frac{x-4}{x+4}$ then $f(4a)$ equals

1) **$\frac{a-1}{a+1}$**
2) $\frac{a+1}{a-1}$
3) $\frac{4a-1}{4a+1}$
4) $\frac{4a+1}{4a-1}$

5076. If $f(x) = (x^0 + x^{\frac{1}{2}})^{-2}$, find f(9).

$\frac{1}{16}$

5064. If $f(a) = a^0 + a^{-2}$, find f(–2).

$1\frac{1}{4}$

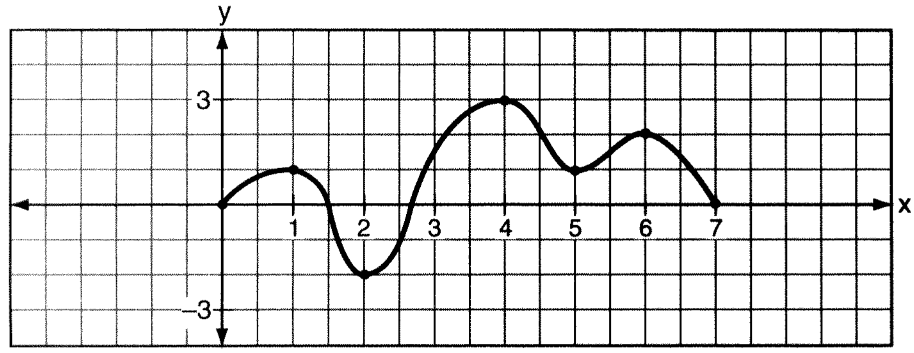
5059. If $f(x) = 4x^{-2} - 2x^0$, find the value of f(2).

–1

4600. If $f(x) = x^{-2} + 27^x$, find $f(\frac{2}{3})$in simplest form.

$11\frac{1}{4}$

5130. The accompanying graph is a sketch **of** the **function** ***y* – f(x) over the** interval $0 \le x \le 7$.



What is the value of $(f \cdot f)(6)$?

1) 1 2) 2 3) 0 **4) –2**

5881. If $f(x) = 2x - 1$ and $g(x) = 3x + 5$, then $(f \bullet g)(x)$ is equal to

1) $5x + 4$ **3) $6x + 9$**
2) $6x + 2$ 4) $6x^2 + 7x - 5$

5819. If $f(x) = 3x + 1$ and $g(x) = x^2 - 1$, find $(f \bullet g)(2)$.

10

5588. If $f(x) = x^2$ and $g(x) = 2x + 1$, which expression is equivalent to $(f \circ g)(x)$?

1) $2x^2 + 1$ 3) $4x^2 + 1$
2) $2(x + 1)^2$ **4) $4x^2 + 4x + 1$**

5127. If $f(x) = x + 1$ and $g(x) = x^2 - 1$, the expression $(g \circ f)(x)$ equals 0 when x is equal to

1) 1 and –1 3) –2, only
2) 0, only **4) 0 and –2**

5126. If $f(x) = \frac{2}{x+3}$, and $g(x) = \frac{1}{x}$, then the expression below is equal to

$$(g \circ f)(x)$$

1) $\frac{1 + 3x}{2x}$
2) $\frac{2x}{1 + 3x}$
3) $\frac{x + 3}{2}$
4) $\frac{x + 3}{2x}$

5125. If f and g are two functions defined by $f(x) = 3x + 5$ and $g(x) = x^2 + 1$, then $g(f(x))$ is

1) $x^2 + 3x + 6$ 3) $3x^2 + 8$
2) $9x^2 + 30x + 26$ 4) $9x^2 + 26$

5108. If $f(x) = x^2$ and $g(x) = x + 1$, what is $(f \circ g)(2)$?

9

5124. If $f(x) = 2^x - 1$ and $g(x) = x^2 - 1$, determine the value of

$$(f \circ g)(4)$$

1) 224 **3) 32,767**
2) 225 4) 32,768

5123. If $f(x) = 2x^2 + 4$ and $g(x) = x - 3$, which number satisfies

$$f(x) = (f \circ g)(x)?$$

1) $\frac{3}{2}$ 3) 5
2) $\frac{3}{4}$ 4) 4

5119. If $f(x) = 5x^2$ and $g(x) = \sqrt{2x}$, what is the value of

$$(f \circ g)(8)$$

1) $8\sqrt{10}$ **3) 80**
2) 16 4) 1,280

5118. Cost Analysis: The cost C to produce x units of a given product per month is given by
$C = f(x) = 19{,}200 + 160x$. If the demand x each month at a selling price of \$$p$ per unit is given by
$x = g(p) = 200 - p/4$
Find $(f \circ g)(p)$ and interpret.

$(f \circ g)(p) = 51{,}200 - 40p$

5116. If $f(x) = 2x - 5$ and $g(x) = \sqrt{x}$, evaluate

$$(f \circ g)(36)$$

7

5111. If $f(x) = 3x^2$ and $g(x) = \sqrt{2x}$, what is the value of $(f \circ g)(8)$?

1) $8\sqrt{6}$ **3) 48**
2) 16 4) 144

5937. Which two functions are inverse functions of each other?
1) $f(x) = \sin x$ and $g(x) = \cos x$
2) $f(x) = 3 + 8x$ and $g(x) = 3 - 8x$
3) $f(x) = e^x$ and $g(x) = \ln x$
4) $f(x) = 2x - 4$ and $g(x) = \frac{-1}{2}x + 4$

5814. What is the inverse of the function $y = 3x - 2$?
1) $y = -3x + 2$
2) $y = \frac{x+2}{3}$
3) $y = \frac{x-2}{3}$
4) $3y = 2x$

5589. What is the inverse of the function $y = 2x - 3$?
1) $y = \frac{x+3}{2}$
2) $y = \frac{x}{2} + 3$
3) $y = -2x + 3$
4) $y = \frac{1}{2x-3}$

5153. If point (a,b) lies on the graph $y = f(x)$, the graph $y = f^{-1}(x)$ must contain point
1) (b,a)
2) (a,0)
3) (0,b)
4) (–a,–b)

5152. A function is defined by the equation $y = 5x - 5$. Which equation defines the inverse of this function?
1) $y = \frac{1}{5x-5}$
2) $y = 5x + 5$
3) $x = \frac{1}{5y-5}$
4) $x = 5y - 5$

5150. If a function is defined by the equation $y = 3x + 2$, which equation defines the inverse of this function?
1) $x = \frac{1}{3}y + \frac{1}{2}$
2) $y = \frac{1}{3}x + \frac{1}{2}$
3) $y = \frac{1}{3}x - \frac{2}{3}$
4) $y = -3x - 2$

5148. $f(x) = x^3 + 5$

Does $f(x)$ have an inverse? If so, find the inverse and decide if it is a function.

yes, $f^{-1}(x) = (x - 5)^{\frac{1}{3}}$ which is a function.

5145. The inverse of the function $y = 2x - 5$ is
1) $y = \frac{1}{2}(x + 5)$
2) $y = \frac{1}{2}(x - 5)$
3) $y = 2x + 5$
4) $y = 5 - 2x$

5142. Given: set $A = (1,2),(2,3),(3,4),(4,5)$

If the inverse of the set is A^{-1}, which statement is true?
1) A and A^{-1} are functions.
2) A and A^{-1} are not functions.
3) A is a function and A^{-1} is not a function.
4) A is not a function and A^{-1} is a function.

4686. A function is defined by the equation $y = \frac{1}{2}x - \frac{3}{2}$. Which equation defines the inverse of this function?
1) $y = 2x + 3$
2) $y = 2x - 3$
3) $y = 2x + \frac{3}{2}$
4) $y = 2x - \frac{3}{2}$

4596. What is the inverse of the function $y = 3x - 2$?
1) $y = 3x + 2$
2) $y = \frac{x+2}{3}$
3) $y = \frac{x-2}{3}$
4) $y = \frac{1}{3}x - 2$

4549. The inverse of a function is a logarithmic function in the form $y = \log_b x$. Which equation represents the original function?
1) $y = b^x$
2) $y = bx$
3) $x = b^y$
4) $by = x$

4518. What is the inverse of the function $y - 2 = 7x$?
1) $y = \frac{2-x}{7}$
2) $y = \frac{2x}{7}$
3) $y = 7x - 2$
4) $y = \frac{x-2}{7}$

4381. Which is an equation of the inverse of $y = \frac{3}{2}x$?
1) $y = \frac{2}{3}x$
2) $y = -\frac{3}{2}x$
3) $y = 3x - 2$
4) $y = \frac{x+3}{2}$

4267. What is the inverse relation of the function whose equation is $y = 3x - 2$?
1) $y = x$
2) $y = 3x + 2$
3) $y = 2x - 3$
4) $y = \frac{x+2}{3}$

4043. What is the inverse of the function $x + 2y + 3 = 0$?
1) $y = -\frac{1}{2}x - \frac{3}{2}$
2) $y = -2x - 3$
3) $2y + x + 3 = 0$
4) $2x - y + 3 = 0$

4025. The inverse of the function $2x + 3y = 6$ is
1) $y = -\frac{2}{3}x + 2$
2) $y = -\frac{3}{2}x + 3$
3) $y = \frac{3}{2}x + 2$
4) $y = \frac{2}{3}x + 3$

4012. Write the inverse of the given function:
{(5,3),(–2,4),(7,–2)}

{(3,5),(4,–2),(–2,7)}

3833. What is the inverse of the function $y = 2x + 3$?
1) $x = \frac{1}{2}y - \frac{3}{2}$
2) $y = \frac{1}{2}x - \frac{3}{2}$
3) $y = 2x + 3$
4) $x = -2y - 3$

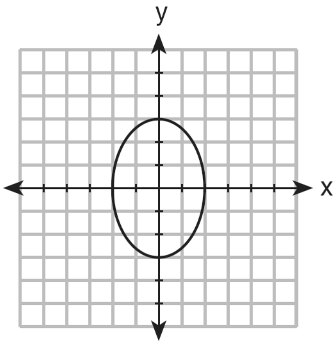
3762. Which is an equation of the inverse of the function $y = 2^x$?
1) $y = \log_2 x$
2) $y = x^2$
3) $x = y^2$
4) $x = \log_2 y$

3745. What is the inverse of $f(x) = -\frac{2}{3}x$?
1) $f^{-1}(x) = \frac{2}{3}x - 3$
2) $f^{-1}(x) = \frac{3}{2}x$
3) $f^{-1}(x) = -\frac{3}{2}x$
4) $f^{-1}(x) = -\frac{2}{3}x$

3696. What is the inverse of $y = 3x - 2$?
1) $y = \frac{x-3}{2}$
2) $y = 2x - 3$
3) $y = \frac{2x-3}{2}$
4) $y = \frac{x+2}{3}$

3667. What is the inverse relation of the function whose equation is $y = 2x + 3$?
1) $y = 2x - 3$
2) $y = \frac{x-3}{2}$
3) $y = 3x - 2$
4) $y = x$

4955. Which graph represents the equation $9x^2 = 36 - 4y^2$?

1)


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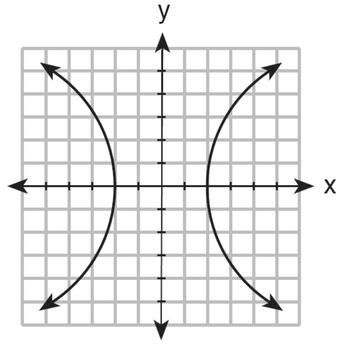

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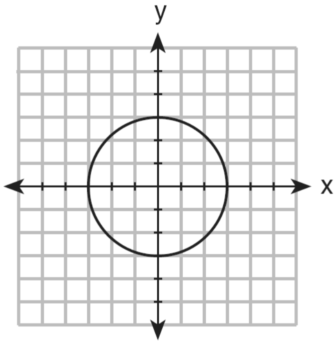

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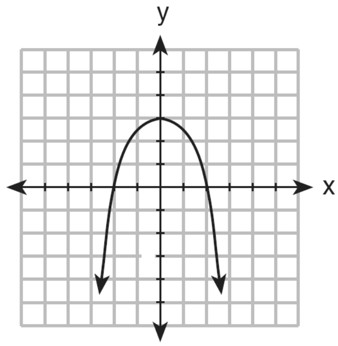


III. FUNCTIONS AND RELATIONS **E. Relations (conic sections)**
3. Hyperbola

5813. The graph of the equation $xy = 12$ is best described as
1) a circle
2) two lines
3) an ellipse
4) a hyperbola

5591. The graph of the equation $2x^2 - 3y^2 = 4$
1) A Circle
2) An Ellipse
3) A Hyperbola
4) A parabola

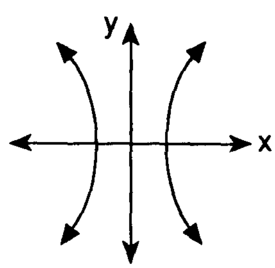
4974. The equation of a hyperbola is

$$\frac{(x-2)^2}{4} - \frac{(y-3)^2}{5} = 1.$$

What are the coordinates of the center of the hyperbola?
1) (2,3)
2) (–2,–3)
3) (3,2)
4) (–3,–2)

4970. An equation of a hyperbola is
1) $x + y = 16$
2) $x^2 + y^2 = 16$
3) $x^2 - y^2 = 16$
4) $2x^2 + y^2 = 16$

4973. Which of the following could be an equation for the graph below?



1) $x^2 + y^2 = 50^2$
2) $\frac{x^2}{50^2} + \frac{y^2}{100^2} = 1$
3) $\frac{x^2}{50^2} - \frac{y^2}{100^2} = 1$
4) $y^2 = 200x$

4972. The graph of the equation $y^2 - x^2 = 4$ forms
1) a circle
2) an ellipse
3) a hyperbola
4) a parabola

4971. The graph of the equation below is

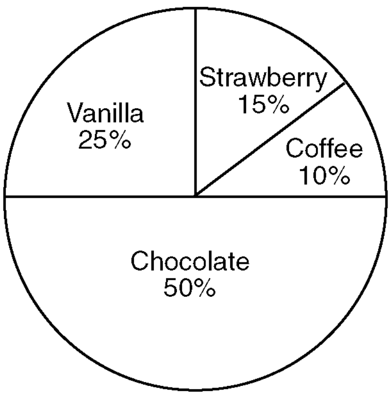
$$\frac{x^2}{9} - \frac{y^2}{16} = 1$$

1) a circle
2) a hyperbola
3) a parabola
4) an ellipse

2896. At the Phoenix Surfboard Company, \$306,000 in profits was made last year. This profit was shared by the four partners in the ratio 3:3:5:7. How much *more* money did the partner with the largest share make than one of the partners with the smallest share?

\$68,000

2894. Mr. Smith's class voted on their favorite ice cream flavors, and the results are shown in the accompanying diagram. If there are 20 students in Mr. Smith's class, how many students chose coffee ice cream as their favorite flavor?



2

2891. The world population was 4.2 billion people in 1982. The population in 1999 reached 6 billion. Find the percent of change from 1982 to 1999.

42.85714286 or an equivalent answer

2876. If the instructions for cooking a turkey state "Roast turkey at 325° for 20 minutes per pound," how many *hours* will it take to roast a 20-pound turkey at 325°?

$6\frac{2}{3}$ or 6 hr 40 min or 6.66 or an equivalent answer.

2875. Ninety percent of the ninth grade students at Richbartville High School take algebra. If 180 ninth grade students take algebra, how many ninth grade students do *not* take algebra?

20

2872. If the circumference of a circle is doubled, the diameter of the circle

1) remains the same
2) increases by 2
3) is multiplied by 4
4) is doubled

2869. Two triangles are similar. The lengths of the sides of the smaller triangle are 3, 5, and 6, and the length of the longest side of the larger triangle is 18. What is the perimeter of the larger triangle?

1) 14
2) 18
3) 24
4) 42

2748. A flagpole casts a shadow 160 feet long. At the same time, a boy standing nearby who is 5 feet tall casts a shadow 20 feet long. Find the number of feet in the height of the flagpole.

40

2707. If jamar can run $\frac{3}{5}$ of a mile in 2 minutes 30 seconds, what is his rate in miles per minute?

1) $-\frac{4}{5}$
2) $-\frac{6}{25}$
3) $-3\frac{1}{10}$
4) $-4\frac{1}{6}$

2702. On a trip, a student drove 40 miles per hour for 2 hours and then drove 30 miles per hour for 3 hours. What is the student's average rate of speed, in miles per hour, for the whole trip?

1) 34
2) 35
3) 36
4) 37

2690. On her first trip, Sari biked 24 miles in *T* hours. The following week Sari biked 32 miles in *T* hours. Determine the ratio of her average speed on her second trip to her average speed on her first trip.

1) $\frac{3}{4}$
2) $\frac{2}{3}$
3) $\mathbf{\frac{4}{3}}$
4) $\frac{3}{2}$

2684. The circumference of a circular plot of land is increased by 10%. What is the best estimate of the total percentage that the area of the plot increased?

1) 10%
2) 21%
3) 25%
4) 31%

2588. In two similar triangles, the ratio of the lengths of a pair of corresponding sides is 7:8. If the perimeter of the larger triangle is 32, find the perimeter of the *smaller* triangle.

28

1055. The profits in a business are to be shared by the three partners in the ratio of 3 to 2 to 5. The profit for the year was \$176,500. Determine the number of dollars each partner is to receive.

\$52,950, \$35,300, and \$88,250 and an appropriate method is shown, such as
$3x + 2x + 5x = \$176,500$

3265. What is the value of

$$\sum_{k=0}^{2} 3(2)^k$$

1) 15
2) 19
3) 21
4) 43

3212. Evaluate:

$$\sum_{k=0}^{3}\left(3\cos k\pi + 1\right)$$

4

3185. Find the value of

$$\sum_{r=2}^{4} {}_5C_r$$

1) 5
2) 10
3) 25
4) 45

3168. A ball is dropped from a height of 8 feet and allowed to bounce. Each time the ball bounces, it bounces back to half its previous height. The vertical distance the ball travels, *d*, is given by the formula

$$d = 8 + 16\sum_{k=1}^{n}\left(\frac{1}{2}\right)^k$$

where *n* is the number of bounces. Based on this formula, what is the total vertical distance that the ball has traveled after four bounces?

1) 8.9 ft
2) 15.0 ft
3) 22.0 ft
4) 23.0 ft

3082. The number of pins knocked down at a bowling alley each day in a month is given by the expression $800 - 3x$, where x is the number of the day. Give an expression in summation notation for the total number of pins knocked down in a 30 day month.

$$\sum_{x=1}^{30}(800 - 3x)$$

3081. The number of visitors to the beach on a summer day is given by the expression $5x^2 - 10x + 10$, where x is the day of the week starting at one, for a given week. Give an expression in summation notation for the total number of visitors to the beach in that week.

$$\sum_{x=1}^{7}(5x^2 - 10x + 10)$$

3080. The number of cars that pass through an intersection each hour during rush hour is given by $40x + 140$, where x is the hour after the beginning of rush hour starting at 1. Give an expression in summation notation for the total number of cars that pass through the intersection during the three hours of rush hour.

$$\sum_{x=1}^{3}(40x + 140)$$

3079. A question writer writes a number of questions each hour given by the expression $100 - 3x - x^2$, where x is the number of hours worked that day beginning at 1. Given an expression in summation notation for the total number of questions written by one writer in an eight-hour day.

$$\sum_{x=1}^{8}(100 - 3x - x^2)$$

3078. The number of hot dogs sold each inning at a baseball game is given by the expression $4x^2 + 4x + 40$, where x is the number of the inning. Give an expression in summation notation for the number of hot dogs sold in a nine inning game.

$$\sum_{x=1}^{9}(4x^2 + 4x + 40)$$

3077. The number of people entering an amusement park each hour is given by the expression $50x^2 + 300$ where x is the number of hours the park has been open that day. Give an expression for the number of people that enter the amusement park in the first 6 hours in summation notation.

$$\sum_{x=1}^{6}(50x^2 + 300)$$

3002. Evaluate: $2\sum_{n=1}^{5} 2n - 1$

50, and appropriate work is shown, such as 2(1 + 3 + 5 + 7 + 9).

2968. Evaluate:

$$\frac{1}{3}\sum_{k=2}^{4}|k - 5|$$

2

5906. What are the first three terms of the recursive sequence defined below.

$a_1 = 5$

$a_{n+1} = a_n + n!$

5, 6, 8

5898. What is the 37^{th} term in the following sequence?

{15, 11, 7...}

15 + (37 – 1)(–4) = –129

5897. What is the n^{th} term in the following sequence?

{-7, -4, -1...}

-7 + (n – 1)3 = 3n - 10

5896. Cans are being stacked on a supermarket shelf. There are 28 cans on the bottom row and 4 cans on the top row. If there are 15 cans and each row is smaller than the one below it by the same number of cans, how many cans are there?

15 × (28 + 4) ÷ 2 = 240 cans

5895. A staircase is made of bricks, with 20 bricks in the first step. If each subsequent step has 3 more bricks, ow many bricks are on the 54^{th} step?

20 + (54-1)3 = 179

5894. Find the first four terms of the recursive sequence defined below, where $a_1 = 3$.

$a_{n+1} = 4a_n + 2n$

3, 16, 70, 288

5185. Write the n^{th} term for the sequence of positive odd numbers.

1) $2n$
2) $2n + 3$
3) $2n – 1$
4) $2n + 2$

5184. What is the nth term of the sequence a_n = {2,4,6,8,...}?

1) $2n$
2) $2n – 1$
3) n
4) $8n$

5192. Write the formula for the nth term of the arithmetic sequence with first term $a_1 = 30.5$ and common difference d = 4.

$a_n = 30.5 + 4n – 4$

5191. What is the 10000^{th} term in the sequence a_n = {0, 10, 20, 30, ...}?

1) 100000
2) 99990
3) 99980
4) 99970

5190. What is the common difference in the arithmetic sequence a_n = { 53, 57, 61, 65, ... }?

1) 3
2) 4
3) 5
4) 6

5189. What is the 30^{th} term of the arithmetic sequence with starting term a_1= 27 and common difference d = –4?

1) –85
2) –93
3) –89
4) –81

5188. The 6^{th} term of an arithmetic sequence is 72 and the common difference between the terms is 40.

What is the first term of the sequence?

1) 1
2) –128
3) –88
4) –168

5187. Write the n^{th} term of the arithmetic sequence a_n = {4, 7, 10, 13, 16,...}. Assume that the first term is $n = 1$

$1 + 3n$

5186. Write the n^{th} term of the sequence 1, 4, 7, 10, 13, ...

$3n – 2$

5827. What is the common difference of the arithmetic sequence 5, 8, 11, 14?

1) $\frac{8}{5}$
2) –3
3) 3
4) 9

5924. What is a formula for the nth term of sequence B shown below?

B = 10, 12, 14, 16, . . .

1) $b_n = 8 + 2n$
2) $b_n = 10 + 2n$
3) $b_n = 10(2)^n$
4) $b_n = 10(2)^{n-1}$

5196. A concert hall has its seats arranged so that each row has thirty more seats than the row in front of it.

If the hall has 20 rows and the third row has 120 seats how many seats are in the last row?

630

5193. Find the sum of the first 100 positive odd integers.

1) 5000
2) 5100
3) 10200
4) 10000

5195. The first row of a stadium has 400 seats. Each subsequent row has 50 more seats than the previous one. The entire stadium has 50 rows.

How many seats are in the entire stadium?

1) 81250 seats
2) 76548 seats
3) 94357 seats
4) 20934 seats

5194. The first row of a stadium has 400 seats each subsequent row has 50 more seats than the last. The entire stadium has 50 rows.

How many seats are in the last row?

1) 2750
2) 2800
3) 2850
4) 2900

5935. What is the common ratio of the geometric sequence whose first term is 27 and fourth term is 64?

1) $\frac{3}{4}$
2) $\frac{64}{81}$
3) $\boldsymbol{\frac{4}{3}}$
4) $\frac{37}{3}$

5859. What is the formula for the *n*th term of the sequence 54, 18, 6, ...?

1) $a_n = 6\left(\frac{1}{3}\right)^n$
3) $a_n = 54\left(\frac{1}{3}\right)^n$
2) $a_n = 6\left(\frac{1}{3}\right)^{n-1}$
4) $a_n = 54\left(\frac{1}{3}\right)^{n-1}$

5209. Write the n^{th} term of the geometric sequence with starting term 3 and common ratio $\frac{1}{5}$.

$$a_n = 3\left(\frac{1}{5}\right)^{n-1}$$

5208. Find the formula for the n^{th} term of the geometric sequence with
$a_1 = \frac{1}{4}$
$r = \frac{1}{2}$

1) $a_n = \frac{1}{2} \bullet \frac{1}{4}^{n-1}$
3) $a_n = \frac{1}{2} \bullet \frac{1}{4}^{n}$
2) $\boldsymbol{a_n = \frac{1}{4} \bullet \frac{1}{2}^{n-1}}$
4) $a_n = \frac{1}{4} \bullet \frac{1}{2}^{n}$

5207. Find the 12^{th} term of the geometric sequence with starting term 5 and common ratio 3.

1) 2958629
3) 885735
2) 586903
4) 2657205

5206. Find the 17^{th} term of the geometric sequence with starting term 2 and common ratio 2.

1) 65536
3) 443298
2) 131072
4) 143202

5205. Find the first five terms of the geometric sequence with;
$r = 4$
$a_1=12$

12, 48, 192, 768, 3072

5198. Assuming that *n* begins at 1, write the n^{th} term of the sequence, $a_n = \{\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16},...\}$.

$\boldsymbol{\frac{1}{2}^{n}}$

5204. Given that the fourth term of a geometric sequence is 12 and the third is 48, find the common ratio.

1) 1
3) 3
2) 2
4) 4

5203. Given that the 3^{rd} term of a geometric sequence is 343 and the fourth is 2401, what is the common ratio?

1) 6
3) 8
2) 7
4) 9

5202. Write the first five terms of the geometric sequence;
$a_1 = 4$
$r = \frac{1}{4}$.

$$4, 1, \frac{1}{4}, \frac{1}{16}, \frac{1}{64}$$

5201. Determine if the given sequence is geometric.

$$a_n = \{3, 12, 21, 30, ...\}$$

It is not geometric.

5200. Determine if the sequence is geometric.

$$a_n = \{2, 4, 6, 8, 10, ...\}$$

It is not geometric.

5199. What is the multiplying factor of the the following geometric sequence?

$$a_n = \{2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, ...\}$$

1) 2
3) –1
2) 1
4) 0.5

5197. Write a formula for the n^{th} term of the sequence
1, –1, 1, –1, 1,...

$\boldsymbol{(-1)^{n+1}}$