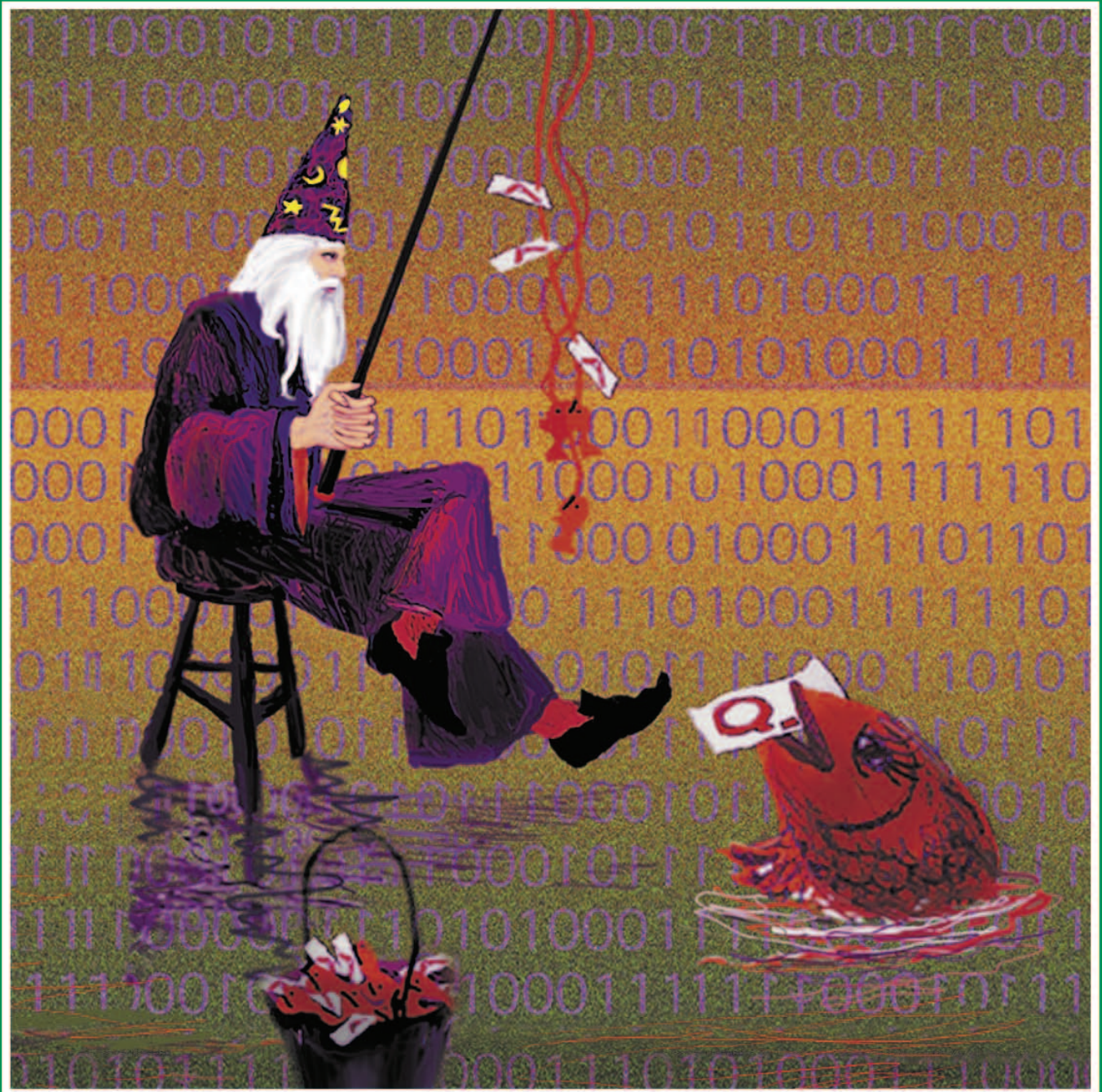


ALGEBRA I



QUESTION CATALOGUE

Integrated Algebra I

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I. NUMBER SENSE
A. Numbers & Operations

1. Numbers, Operations, and Functions
vii. Properties of Operations

3901 Under which operation is the set of odd integers closed?

- (1) addition (3) **multiplication**
 (2) subtraction (4) division

3897 Which property of real numbers is illustrated by the equation $52 + (27 + 36) = (52 + 27) + 36$?

- (1) commutative property
 (2) **associative property**
 (3) distributive property
 (4) identity property of addition

3859 What is the additive inverse of the expression $a - b$?

- (1) $a + b$ (3) **$-a + b$**
 (2) $a - b$ (4) $-a - b$

3752 Which property is illustrated by the equation $4x(2x - 1) = 8x^2 - 4x$?

- (1) associative (3) **distributive**
 (2) commutative (4) identity

3733 Which property is illustrated by the equation $6 + (4 + x) = 6 + (x + 4)$?

- (1) associative property of addition
 (2) associative property of multiplication
 (3) distributive property
 (4) **commutative property of addition**

3679 What property is represented by the statement $\frac{1}{2}(6a + 4b) = 3a + 2b$?

- (1) commutative (3) associative
 (2) **distributive** (4) identity

3629 The statement $2 + 0 = 2$ is an example of the use of which property of real numbers?

- (1) associative (3) additive inverse
 (2) **additive identity** (4) distributive

2849 What is half of 2^6 ?

- (1) 1^3 (3) 2^3
 (2) 1^6 (4) **2^5**

2808 Which property is illustrated by the equation $\frac{3}{2}x + 0 = \frac{3}{2}x$?

- (1) Commutative Property of Addition
 (2) Distributive Property
 (3) Additive Inverse Property
 (4) **Additive Identity Property**

2780 If M and A represent integers, $M + A = A + M$ is an example of which property?

- (1) **commutative** (3) distributive
 (2) associative (4) closure

2676 The equation $*(\Delta + \heartsuit) = *\Delta + *\heartsuit$ is an example of the

- (1) associative law (3) **distributive law**
 (2) commutative law (4) transitive law

2648 Which equation illustrates the distributive property?

- (1) **$5(a + b) = 5a + 5b$** (3) $a + b = b + a$
 (2) $a + (b + c) = (a + b) + c$ (4) $a + 0 = a$

2614 Which expression is an example of the associative property?

- (1) **$(x + y) + z = x + (y + z)$** (3) $x(y + z) = xy + xz$
 (2) $x + y + z = z + y + x$ (4) $x \cdot 1 = x$

2608 Which property of real numbers is illustrated by the equation $-\sqrt{3} + \sqrt{3} = 0$.

- (1) additive identity
 (2) commutative property of addition
 (3) associative property of addition
 (4) **additive inverse**

2589 Which equation illustrates the associative property of addition?

- (1) $x + y = y + x$ (3) **$(3 + x) + y = 3 + (x + y)$**
 (2) $3(x + 2) = 3x + 6$ (4) $3 + x = 0$

2554 Tori computes the value of 8×95 in her head by thinking $8(100 - 5) = 8 \times 100 - 8 \times 5$. Which number property is she using?

- (1) associative (3) commutative
 (2) **distributive** (4) closure


2544 The table below shows the set $\{F, A, C, E\}$ and the operation ∞ .

∞	F	A	C	E
F	A	E	F	A
A	E	C	A	F
C	F	A	C	E
E	A	F	E	C

Which statement is *not* true?

- (1) The identity element for the set is C.
 (2) The set is commutative under
 (3) **Every element of the set has an inverse.**
 (4) $(F \infty A) \infty C = E$

2484 What is the inverse of G in the system below?

	F	L	A	G
F	L	G	F	A
L	G	A	L	F
A	F	L	A	G
G	A	F	G	L

F

2206 Which equation illustrates the distributive property?

- (1) **$p(q + r) = pq + pr$** (3) $pq = qp$
 (2) $(p + g) + r = p + (g + r)$ (4) $p + 0 = p$

4530 Express in simplest radical form.

$$-3\sqrt{48}$$

$$-12\sqrt{3}$$

4202 When $5\sqrt{20}$ is written in simplest radical form, the result is $k\sqrt{5}$. What is the value of k ?

- (1) 20 (3) 7
(2) **10** (4) 4

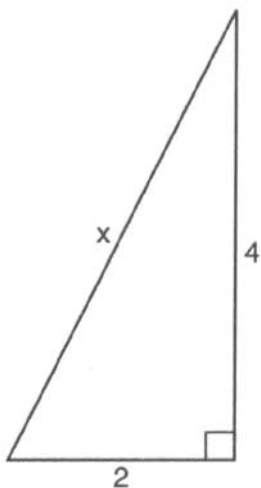
3843 What is $\sqrt{32}$ expressed in simplest radical form?

- (1) $16\sqrt{2}$ (3) $4\sqrt{8}$
(2) **$4\sqrt{2}$** (4) $2\sqrt{8}$

3814 What is $\sqrt{72}$ expressed in simplest radical form?

- (1) $2\sqrt{18}$ (3) **$6\sqrt{2}$**
(2) $3\sqrt{8}$ (4) $8\sqrt{3}$

3779 Theo determined that the correct length of the hypotenuse of the right triangle in the accompanying diagram is $\sqrt{20}$. Fiona found the length of the hypotenuse to be $2\sqrt{5}$. Is Fiona's answer also correct? Justify your answer.



Yes.

3717 Which expression is equivalent to $7\sqrt{90}$?

- (1) $16\sqrt{10}$ (3) $70\sqrt{9}$
(2) **$21\sqrt{10}$** (4) $\sqrt{630}$

2801 The expression $\sqrt{54-B}$ is equivalent to a positive integer when B is equal to

- (1) **-10** (3) 54
(2) 16 (4) 4

2642 When $\sqrt{72}$ is expressed in simplest $ab^{\frac{1}{2}}$ form, what is the value of a ?

- (1) **6** (3) 3
(2) 2 (4) 8

2585 If $a > 0$, then $\sqrt{9a^2 + 16a^2}$ equals

- (1) $\sqrt{7a}$ (3) **$5a$**
(2) $5\sqrt{a}$ (4) $7a$

2480 The altitude drawn to the hypotenuse of a right triangle divides the hypotenuse into segments of 4 and 12. Express the length of the altitude in radical form.

$$\sqrt{48}$$

2300 Simplify:

$$\text{Simplify : } \sqrt{50r^2s^4}$$

$$5rs^2\sqrt{2}$$

2241 If $x > 0$, the expression $(\sqrt{x})(\sqrt{2x})$ is equivalent to

- (1) $\sqrt{2x}$ (3) $x^2\sqrt{2}$
(2) $2x$ (4) **$x\sqrt{2}$**

1139 The expression $\sqrt{50}$ can be simplified to

- (1) **$5\sqrt{2}$** (3) $2\sqrt{25}$
(2) $5\sqrt{10}$ (4) $25\sqrt{2}$

1077 Express $\sqrt{75}$ in simplest radical form.

$$5\sqrt{3}$$

1047 When simplified, $\sqrt{50}$ equals $x\sqrt{y}$. If x and y are both integers, what is the value of x ?

$$5$$

1018 The expression $\sqrt{200}$ is equivalent to

- (1) $2\sqrt{10}$ (3) $100\sqrt{2}$
(2) **$10\sqrt{2}$** (4) $2\sqrt{100}$

931 The expression $\sqrt{75}$ is equal to

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

880 The expression $\sqrt{500}$ is equivalent to

- (1) $50\sqrt{10}$ (3) **$10\sqrt{5}$**
(2) $5\sqrt{10}$ (4) $10\sqrt{50}$

802 The expression $\sqrt{500}$ is equivalent to

- (1) $5\sqrt{10}$ (3) $500\sqrt{2}$
(2) **$10\sqrt{5}$** (4) $5\sqrt{100}$

768 Which is equivalent to $\sqrt{40}$?

- (1) **$2\sqrt{10}$** (3) $4\sqrt{10}$
(2) $2\sqrt{20}$ (4) $10\sqrt{2}$

738 If $\sqrt{84}$ is simplified to $a\sqrt{b}$ such that a and b are integers, what is the value of a ?

$$2$$

667 The expression $2\sqrt{5}$ is equivalent to

- (1) $\sqrt{10}$ (3) $\sqrt{50}$
(2) **$\sqrt{20}$** (4) $\sqrt{100}$

633 The expression $\sqrt{50}$ is equivalent to

- (1) **$5\sqrt{2}$** (3) $2\sqrt{5}$
(2) $25\sqrt{2}$ (4) $5\sqrt{10}$

619 The expression $\sqrt{200}$ is equivalent to

- (1) $25\sqrt{8}$ (3) $2\sqrt{10}$
(2) $100\sqrt{2}$ (4) **$10\sqrt{2}$**

- 4454 The expression $\sqrt{72} - 3\sqrt{2}$ written in simplest radical form is
 (1) $5\sqrt{2}$ (2) $3\sqrt{6}$ (3) $3\sqrt{2}$ (4) $\sqrt{6}$
- 4419 The expression $6\sqrt{50} + 6\sqrt{2}$ written in simplest radical form is
 (1) $6\sqrt{52}$ (2) $12\sqrt{52}$ (3) $17\sqrt{2}$ (4) $36\sqrt{2}$
- 3888 The sum of $\sqrt{27}$ and $\sqrt{108}$ is
 (1) $\sqrt{135}$ (2) $9\sqrt{3}$ (3) $3\sqrt{3}$ (4) $4\sqrt{27}$
- 3693 The expression $\sqrt{28} - \sqrt{7}$ is equivalent to
 (1) $\sqrt{7}$ (2) 2 (3) $3\sqrt{7}$ (4) 4
- 2816 The expression $\sqrt{28} + \sqrt{63}$ is equivalent to
 (1) $\sqrt{91}$ (2) $5\sqrt{7}$ (3) $6\sqrt{7}$ (4) $13\sqrt{7}$
- 2687 What is the sum of $5\sqrt{7}$ and $3\sqrt{28}$?
 (1) $9\sqrt{7}$ (2) $11\sqrt{7}$ (3) $60\sqrt{7}$ (4) $8\sqrt{35}$
- 2654 The expression $\sqrt{50} + \sqrt{32}$ is equivalent to
 (1) $9\sqrt{2}$ (2) $\sqrt{82}$ (3) 6 (4) 18
- 2562 The sum of $\sqrt{18}$ and $\sqrt{72}$ is
 (1) $\sqrt{90}$ (2) $9\sqrt{2}$ (3) $3\sqrt{10}$ (4) $6\sqrt{3}$
- 2456 The sum of $\sqrt{75}$ and $\sqrt{3}$ is
 (1) 15 (2) 18 (3) $6\sqrt{3}$ (4) $\sqrt{78}$
- 2370 Express in simplest form: $\sqrt{48} - 5\sqrt{27} + 2\sqrt{75} - \sqrt{3}$
- 2176 The sum of $\sqrt{8}$ and $\sqrt{18}$ is
 (1) $5\sqrt{2}$ (2) $13\sqrt{2}$ (3) $13\sqrt{4}$ (4) $\sqrt{26}$
- 1134 The expression $\sqrt{27} + \sqrt{12}$ is equivalent to
 (1) $5\sqrt{3}$ (2) $15\sqrt{3}$ (3) $5\sqrt{6}$ (4) $\sqrt{39}$
- 1125 The sum of $\sqrt{12}$ and $\sqrt{75}$ is
 (1) $7\sqrt{3}$ (2) $29\sqrt{3}$ (3) $7\sqrt{6}$ (4) $\sqrt{87}$
- 1111 The expression $\sqrt{8} - \sqrt{50}$ is equivalent to
 (1) $-7\sqrt{2}$ (2) $-\sqrt{42}$ (3) $-3\sqrt{2}$ (4) $5\sqrt{2}$
- 1072 The sum of $6\sqrt{2}$ and $\sqrt{50}$ is
 (1) $\sqrt{2}$ (2) $11\sqrt{2}$ (3) $31\sqrt{2}$ (4) 60
- 1033 What is the sum of $4\sqrt{12}$ and $2\sqrt{27}$ in simplest form?
 $14\sqrt{3}$
- 914 Express the sum of $\sqrt{18} + 5\sqrt{2}$ in simplest radical form.
 $8\sqrt{2}$
- 993 What is $5\sqrt{2} - \sqrt{18}$ expressed in simplest radical form?
 (1) $2\sqrt{2}$ (2) $-2\sqrt{2}$ (3) $8\sqrt{2}$ (4) $-8\sqrt{2}$
- 972 The sum of $3\sqrt{5}$ and $6\sqrt{5}$ is
 (1) $18\sqrt{5}$ (2) 45 (3) $9\sqrt{10}$ (4) $9\sqrt{5}$
- 961 The expression $2\sqrt{2} + \sqrt{50}$ is equivalent to
 (1) $2\sqrt{52}$ (2) $3\sqrt{52}$ (3) $7\sqrt{2}$ (4) $27\sqrt{2}$
- 945 The sum of $\sqrt{12}$ and $5\sqrt{3}$ is
 (1) $7\sqrt{3}$ (2) $10\sqrt{3}$ (3) $6\sqrt{15}$ (4) $15\sqrt{3}$
- 858 The expression $3\sqrt{27} - \sqrt{12}$ is equivalent to
 (1) $7\sqrt{3}$ (2) $23\sqrt{3}$ (3) $15\sqrt{3}$ (4) $4\sqrt{3}$
- 846 The expression $\sqrt{18} + \sqrt{32}$ is equivalent to
 (1) $2\sqrt{7}$ (2) $5\sqrt{2}$ (3) $7\sqrt{2}$ (4) $13\sqrt{2}$
- 829 The expression $5\sqrt{8} - 3\sqrt{2}$ is equivalent to
 (1) 7 (2) $7\sqrt{2}$ (3) $2\sqrt{6}$ (4) $\sqrt{34}$
- 815 The expression $\sqrt{27} + \sqrt{12}$ is equal to
 (1) $13\sqrt{3}$ (2) $5\sqrt{3}$ (3) $5\sqrt{6}$ (4) $\sqrt{39}$
- 757 The sum of $\sqrt{50}$ and $\sqrt{2}$ is
 (1) $\sqrt{52}$ (2) 10 (3) $6\sqrt{2}$ (4) 12
- 726 What is the sum of $3\sqrt{5}$ and $\sqrt{20}$?
 (1) 15 (2) $5\sqrt{5}$ (3) $5\sqrt{10}$ (4) $6\sqrt{5}$
- 716 The expression $2\sqrt{3} - \sqrt{27}$ equivalent to
 (1) $2\sqrt{24}$ (2) $5\sqrt{3}$ (3) $-5\sqrt{3}$ (4) $-\sqrt{3}$
- 692 If the sum of $\sqrt{50}$ and $x\sqrt{2}$ is $8\sqrt{2}$, find the value of x .
 3
- 682 The sum of $\sqrt{27}$ and $6\sqrt{3}$ is
 (1) $7\sqrt{30}$ (2) $9\sqrt{3}$ (3) $9\sqrt{6}$ (4) $15\sqrt{3}$
- 648 The expression $5\sqrt{3} - \sqrt{27}$ is equivalent to
 (1) $8\sqrt{3}$ (2) $-8\sqrt{3}$ (3) $-2\sqrt{3}$ (4) $2\sqrt{3}$
- 584 The sum of $\sqrt{50}$ and $\sqrt{18}$ is
 (1) $2\sqrt{17}$ (2) $8\sqrt{2}$ (3) $15\sqrt{2}$ (4) 34
- 569 The sum of $\sqrt{12}$ and $5\sqrt{3}$
 (1) $10\sqrt{3}$ (2) $7\sqrt{6}$ (3) $7\sqrt{3}$ (4) 360
- 526 The sum of $\sqrt{18}$ and $6\sqrt{2}$ is
 (1) $7\sqrt{20}$ (2) $9\sqrt{2}$ (3) $15\sqrt{2}$ (4) 18

- 3763 What is $6x^3 + 4x^2 + 2x$ divided by $2x$?
- (1) $3x^2 + 2x$ (3) $4x^2 + 2x$
 (2) $3x^2 + 2x + 1$ (4) $4x^2 + 2x + 1$
- 2782 The expression $(50x^3 - 60x^2 + 10x) \div 10x$ is equivalent to
- (1) $5x^2 - 6x + 1$ (3) $5x^2 - 60x^2 + 10x$
 (2) $5x^3 - 6x^2 + x$ (4) $5x^2 - 6x$
- 2651 When $3x^2 - 6x$ is divided by $3x$, the result is
- (1) $-2x$ (3) $x + 2$
 (2) $2x$ (4) $x - 2$
- 2575

What is the value of $\frac{x^2 - 4y}{2}$, if $x = 4$ and $y = -3$?

- (1) -2 (3) 10
 (2) 2 (4) 14

2261 Which polynomial is the quotient of $\frac{6x^3 + 9x^2 + 3x}{3x}$?

- (1) $2x^2 + 3x + 1$ (3) $2x + 3$
 (2) $2x^2 + 3x$ (4) $6x^2 + 9x$

2247 If $x \neq 0$, the expression $\frac{x^2 + 2x}{x}$ is equivalent to

- (1) $x + 2$ (3) $3x$
 (2) 2 (4) 4

2197 When $18x^4 - 12x^3 + 6x^2$ is divided by $6x^2$, the quotient is

- (1) $3x^2 - 2x + 1$ (3) $18x^4 - 12x^3 + 1$
 (2) $12x^2 - 6x + 1$ (4) $3x^2 - 12x^3 + 6x^2$

1113 When $8x^4 - 8x$ is divided by $8x$, the quotient is

- (1) x^3 (3) $x^3 - x$
 (2) x^2 (4) $x^3 - 1$

1097 Expressed in simplest form, $\frac{30x^3 - 15x^2 + 5x}{5x}$,

$x \neq 0$, is equivalent to

- (1) $6x^2 - 3x$ (3) $6x^2 - 3x + 1$
 (2) $25x^2 - 10x$ (4) $25x^2 - 10x + 1$

1083 What is the quotient of $\frac{18x^6 - 6x^4 - 2x^2}{-2x^2}$, $x \neq 0$?

- (1) $-9x^4 + 3x^2 + 1$ (3) $-9x^8 + 3x^6$
 (2) $-9x^3 + 3x^2 + 1$ (4) $16x^4 - 8x^2 - 4$

1069 When $5x^4 - 5x$ is divided by $5x$, the quotient is

- (1) x^3 (3) $x^3 - 1$
 (2) $x^5 - 1$ (4) $5x$

1052 If $21x^3 - 42x^2 + 3x$ is divided by $3x$, the quotient is

- (1) $7x^2 - 14x + 1$ (3) $7x^2 - 14x$
 (2) $7x^3 - 42x^2 + 3x$ (4) $7x^2 + 14x - 1$

976 If $28x^3 - 36x^2 + 4x$ is divided by $4x$, the quotient will be

- (1) $7x^2 - 9x$ (3) $7x^2 - 9x + 1$
 (2) $28x^3 - 36x^2$ (4) $28x^3 - 36x^2 + 1$

1017 The expression $\frac{12z^4 + 20z^3 - 4z^2}{-4z^2}$, $z \neq 0$, is equivalent to

- (1) $-4z^2$ (3) $-3z^2 - 5z + 1$
 (2) $-3z^2 - 5z$ (4) $3z^2 - 5z - 1$

964 If $12x^3 - 15x^2 + 3x$ is divided by $3x$, the quotient is

- (1) $4x^2 - 5x$ (3) $4x^3 - 5x^2$
 (2) $4x^2 - 5x + 1$ (4) $4x^3 - 5x^2 + 1$

940 Find the quotient:

$$\frac{15x^2 - 12x + 9}{3}$$

$$5x^2 - 4x + 3$$

917 If $12x^2 - 3x$ is divided by $3x$, the quotient is

- (1) $4x - 3$ (3) $3x$
 (2) $4x - 1$ (4) $4x$

904 The expression $\frac{16y^3 + 4y^2 + 2y}{-2y}$, $y \neq 0$, is

equivalent to

- (1) $-8y^2 - 2y - 1$ (3) $-2y$
 (2) $-8y^2 - 2y$ (4) $8y^2 - 2y - 1$

844 The expression $\frac{25m^3 + 10m^2 - 5m}{5m}$, $m \neq 0$, is

equivalent to

- (1) $5m^2 + 2m - 1$ (3) $6m$
 (2) $5m^2 + 2m$ (4) $5m + 5m - 1$

826 When $12x^4 - 3x^3 + 6x^2$ is divided by $3x^2$, the quotient is

- (1) $4x^2 - 3x^3 + 6x^2$ (3) $9x^2 - x + 2$
 (2) $12x - 3x^3 + 2$ (4) $4x^2 - x + 2$

771 If $14x^3 - 35x^2 + 7x$ is divided by $7x$, the quotient is

- (1) $2x^2 - 5x$ (3) $2x^3 - 5x^2 + x$
 (2) $2x^2 - 5x + 1$ (4) $2x^2 - 5x + x$

743 The expression $\frac{15k^3 - 9k^2 + 3k}{3k}$, $k \neq 0$, is

- (1) $5k^2 - 3k + 1$ (3) $15k^3 - 9k^2$
 (2) $5k^2 - 3k + 1$ (4) $3k$

680 Which expression is the simplest form of

$$\frac{25x^4y^2 - 15x^2y}{5xy} \text{ if } x \neq 0 \text{ and } y \neq 0?$$

- (1) $5x^3y - 15x^2y$ (3) $5x^4y^2 - 3x^2y$
 (2) $5x^3y - 3x$ (4) $2x$

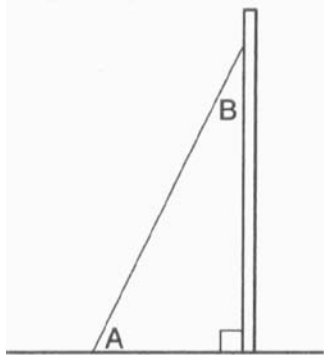
675 Solve $4 - x$, $x \neq 0$, for the positive value of x .

4

581 If $12x^4 - 3x^3 + 6x^2$ is divided by $3x^2$, the quotient is

- (1) $9x^2 - 3$ (3) $4x^2 - 3x + 2$
 (2) $5x^2$ (4) $4x^2 - x + 2$

- 3783 A billboard on level ground is supported by a brace, as shown in the accompanying diagram. The measure of angle A is 15° greater than twice the measure of angle B . Determine the measure of angle A and the measure of angle B .



$m\angle A = 65^\circ$ and $m\angle B = 25^\circ$

- 3782 The mean of three numbers is 25. The second number is four less than twice the first. The third number is two more than four times the first. Find the *smallest* number.

11

- 3716 What is the value of x in the equation $5 - 3x = -7$?

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

- 2813 The graph of the equation $2x + 6y = 4$ passes through point $(x, -2)$. What is the value of x ?

- (1) -4 (3) 16
(2) 8 (4) 4

- 2695 Seth bought a used car that had been driven 20,000 miles. After he owned the car for 2 years, the total mileage of the car was 49,400. Find the average number of miles he drove *each month* during those 2 years.

1225

- 2659 If $-2x + 3 = 7$ and $3x + 1 = 5 + y$, the value of y is

- (1) 1 (3) **-10**
 (2) 0 (4) 10

- 2647 The amount of time, t , in seconds, it takes an object to fall a distance, d , in meters, is expressed by the following formula.

$$t = \sqrt{\frac{d}{4.9}}$$

Approximately how long will it take an object to fall 75 meters?

- (1) 0.26 sec (3) **3.9 sec**
 (2) 2.34 sec (4) 7.7 sec

- 2468 Arielle has a collection of grasshoppers and crickets. She has 561 insects in all. The number of grasshoppers is twice the number of crickets. Find the number of *each* type of insect that she has.

374 grasshoppers and 187 crickets

- 2311 Walter has to drive 11 miles to school roads with an average speed limit of 40 miles per hour.

- a* What is the minimum number of minutes Walter will need to get to school if he travels at the average speed limit?
b Walter's friend Luisa is to meet him at school and does not want to be late or early. They are to meet at 7:30 am. Luisa lives 7 miles from the school, and the roads she must travel have an average speed limit of 35 miles per hour. At what time should she leave in order to be at school at 7:30 a.m. if she travels at the speed limit?

$a \ d = r \cdot t$

$\frac{11}{40} = t$

0.275 = t or 16.5 minutes

$b \ d = r \times t$

$7 = 35t$

$0.2 = t$

$t = 0.2 \times 60 \text{ minutes}$

$t = 12 \text{ minutes}$

7:30 - 12 minutes = 7:18 a.m.

- 2283 Ramon rented a sprayer and a generator. On his first job, he used each piece of equipment for 6 hours at a total cost of \$90. On his second job, he used the sprayer for 4 hours and the generator for 8 hours at a total cost of \$100. What was the hourly cost of *each* piece of equipment?

\$5 for the sprayer and \$10 for the generator

- 2276 Ben had twice as many nickels as dimes. Altogether, Ben had \$4.20. How many nickels *and* how many dimes did Ben have?

42 nickels and 21 dimes

- 2188 Solve for x : $7x + 3 = 4x - 9$

-4

- 2177 A craft shop sold 150 pillows. Small pillows were \$6.50 each and large pillows were \$9.00 each. If the total amount collected from the sale of these items was \$1180.00, what is the total number of each size pillow that was sold?

68 small pillows

82 large pillows

- 2118 Solve for x : $0.2x + 4.1 = 12.5$

42

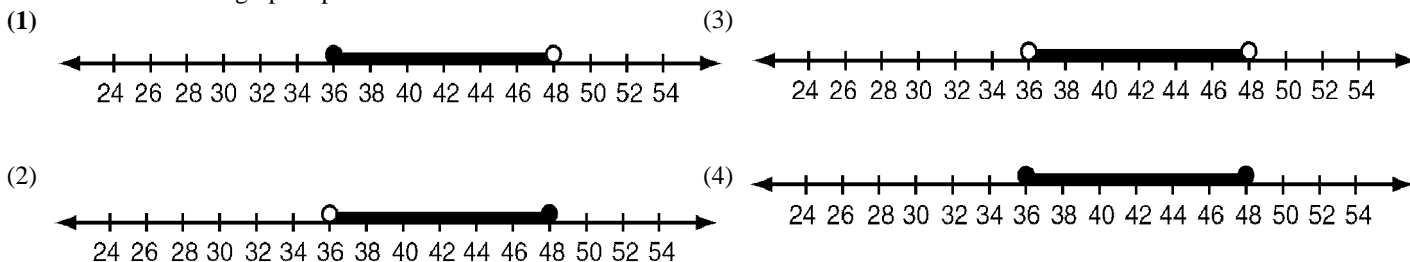
- 1102 Solve for x : $0.05x - 2 = 8$

200

- 1094 In the equation $0.03x - 0.1 = 2.6$, what is the value of x ?

- (1) 9 (3) 120
(2) 90 (4) 130

2725 In order to be admitted for a certain ride at an amusement park, a child must be greater than or equal to 36 inches tall and less than 48 inches tall. Which graph represents these conditions?



4193 Which value of x is in the solution set of the inequality $-2(x - 5) < 4$?

- (1) 0 (3) 3
(2) 2 (4) 5

3847 Which value of x is in the solution set of $\frac{4}{3}x + 5 < 17$?

- (1) 8 (3) 12
(2) 9 (4) 16

3670 The statement “ $a > 2$ and $a < 5$ ” is true when a is equal to

- (1) 10 (3) 3
(2) 2 (4) 5

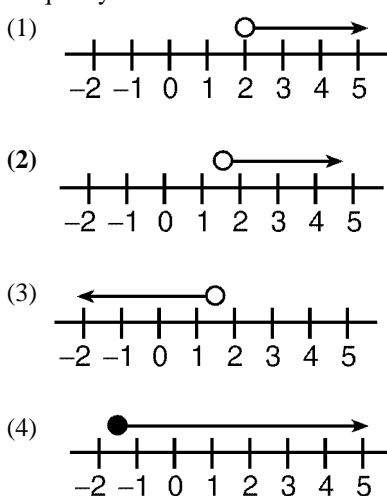
3632 Which value of x is in the solution set of the inequality $-4x + 2 > 10$?

- (1) -2 (3) 3
(2) 2 (4) -4

2857 Students in a ninth grade class measured their heights, h , in centimeters. The height of the shortest student was 155 cm, and the height of the tallest student was 190 cm. Which inequality represents the range of heights?

- (1) $155 < h < 190$ (3) $h \geq 155$ or $h \leq 190$
(2) $155 \leq h \leq 190$ (4) $h > 155$ or $h < 190$

2753 Which graph best represents the solution set for the inequality $x > \sqrt{2}$?



987 Which inequality is the solution of $x + 78 \geq 14$?

- (1) $x \geq 92$ (3) $x \geq -64$
(2) $x \geq 64$ (4) $x \leq -92$

410 Which number is not a member of the solution set of $3x \leq 6$?

- (1) 0 (3) 3
(2) -1 (4) $\frac{1}{2}$

286 If the replacement set for x is $\{-3, -1, 0, 1, 3\}$, write the members of the solution set for $3x < 0$.

-3, -1

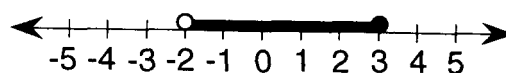
2273 In the set of positive integers, what is the solution set of the inequality $2x - 3 < 5$?

- (1) $\{0, 1, 2, 3\}$ (3) $\{0, 1, 2, 3, 4\}$
(2) $\{1, 2, 3\}$ (4) $\{1, 2, 3, 4\}$

2239 There are 461 students and 20 teachers taking buses on a trip to a museum. Each bus can seat a maximum of 52. What is the *least* number of buses needed for the trip?

- (1) 8 (3) 10
(2) 9 (4) 11

2169 Which inequality is represented by the graph below?



- (1) $-2 \leq x \leq 3$ (3) $-2 \leq x < 3$
(2) $-2 < x < 3$ (4) $-2 < x \leq 3$

1095 If x is a member of the set of integers, the solution set of $4 < x \leq 1$ is

- (1) $\{-4, -3, -2, 0\}$ (3) $\{-3, -2, -1, 0, 1\}$
(2) $\{-4, -3, -2, 0, 1\}$ (4) $\{-3, -2, 0\}$

1086 Which element is in the solution set for the inequality $5x - 2 < 8$?

- (1) $\{0\}$ (3) $\{3\}$
(2) $\{2\}$ (4) $\{5\}$

1003 Which number is not a member of the solution set of the inequality $4x \geq 18$?

- (1) 4.4 (3) 4.6
(2) 4.5 (4) 4.7

875 The expression $5 \leq x - 2$ is equivalent to

- (1) $x \leq 7$ (3) $x \geq 3$
(2) $x \geq 7$ (4) $x \geq \frac{5}{2}$

767 Which number is *not* a member of the solution set of $5x \leq 23$?

- (1) 0 (3) 4.6
(2) -4.7 (4) 4.7

711 If x is an integer, which is the solution set of $-1 \leq x < 2$?

- (1) $\{0, 1\}$ (3) $\{0, 1, 2\}$
(2) $\{-1, 0, 1, 2\}$ (4) $\{-1, 0, 1\}$

486 Given the replacement set $\{2, 4, 6, 8\}$, find the solution set for the inequality $4x \leq 8$.

$\{2\}$

443 If the replacement set for the variable x is $2, 9, 21, 54, 83$ what is the solution set for the inequality $3x < 54$?

2, 9

A. Systems of Equations

2842 Jack bought 3 slices of cheese pizza and 4 slices of mushroom pizza for a total cost of \$12.50. Grace bought 3 slices of cheese pizza and 2 slices of mushroom pizza for a total cost of \$8.50. What is the cost of one slice of mushroom pizza?

- (1) \$1.50 (3) \$3.00
(2) **\$2.00** (4) \$3.50

2683 A bicyclist leaves Bay Shore traveling at an average speed of 12 miles per hour. Three hours later, a car leaves Bay Shore, on the same route, traveling at an average speed of 30 miles per hour. How many hours after the car leaves Bay Shore will the car catch up to the cyclist?

- (1) 8 (3) 5
(2) **2** (4) 4

2470 Alexandra purchases two doughnuts and three cookies at a doughnut shop and is charged \$3.30. Briana purchases five doughnuts and two cookies at the same shop for \$4.95. All the doughnuts have the same price and all the cookies have the same price. Find the cost of one doughnut and find the cost of one cookie.

One doughnut is \$0.75 and one cookie is \$0.60.

2156 Solve the following system of equations for x :

$$\begin{aligned} 2x - 3y &= 9 \\ 3x + 3y &= 11 \end{aligned}$$

4

2131 What is the solution set of the following system of equations?

$$\begin{aligned} x + y &= 7 \\ x - y &= 3 \end{aligned}$$

- (1) (3,4) (3) (10,-3)
(2) **(5,2)** (4) (8,-1)

1521 Solve the following system of equations for x :

$$\begin{aligned} 3x + y &= 14 \\ 2x - y &= 16 \end{aligned}$$

6

1513 Solve the following system of equations for x :

$$\begin{aligned} x - 2y &= 5 \\ 3x + 2y &= 23 \end{aligned}$$

7

1506 Solve the following system of equations for x :

$$\begin{aligned} 3x + y &= 17 \\ 2x - y &= -12 \end{aligned}$$

1

1490 Which ordered pair is the solution to this system of equations?

$$\begin{aligned} 2x - y &= 10 \\ x + y &= 2 \end{aligned}$$

- (1) **(4,-2)** (3) (2,-4)
(2) (4,2) (4) (-4,2)

1498 What is the solution for x in the following system of equations?

$$\begin{aligned} -y &= 2x - 3 \\ y &= -x + 1 \end{aligned}$$

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

1488 Solve the following system of equations algebraically and check:

$$\begin{aligned} 2x + 3y &= 17 \\ 3x - 2y &= -0.5 \end{aligned}$$

$x = 2.5, y = 4$

Check

1484 At which point will the graphs of the equations $2x + y = 8$ and $x - y = 4$ intersect?

- (1) (0,4) (3) (-4,0)
(2) **(4,0)** (4) (5,-2)

1477 Solve the following system of equations for x :

$$\begin{aligned} 2x + y &= 10 \\ 3x &= y \end{aligned}$$

2

1475 Which ordered pair is the solution set for this system of equations?

$$\begin{aligned} x + y &= 8 \\ y &= x - 3 \end{aligned}$$

- (1) (2.5,5.5) (3) (4,4)
(2) (4,1) (4) **(5.5,2.5)**

1462 Solve the following system of equations for y :

$$\begin{aligned} 2x + y &= 12 \\ -2x + 3y &= -4 \end{aligned}$$

2

1456 Solve the following system of equations for x :

$$\begin{aligned} 2x + y &= 10 \\ 3x - y &= 15 \end{aligned}$$

5

1447 What is the solution for the following system of equations?

$$\begin{aligned} x &= -y \\ x + 2y &= 6 \end{aligned}$$

- (1) (-2,2) (3) (6,-6)
(2) (2,-2) (4) **(-6,6)**

1436 Solve the following system of equations for x :

$$\begin{aligned} 6x + y &= 18 \\ 2x - y &= 2 \end{aligned}$$

2.5

1424 Solve the following system of equations for x :

$$\begin{aligned} 4x + y &= 11 \\ x + y &= 2 \end{aligned}$$

3

1435 Solve the following system of equations algebraically and check:

$$\begin{aligned} 3x - 5y &= -6 \\ 2x - 3y &= -5 \end{aligned}$$

$$\begin{aligned} x &= -7 \\ y &= -3 \end{aligned}$$

1416 Solve the following system of equations for x :

$$\begin{aligned} x + 3y &= 6 \\ 2x - 3y &= 3 \end{aligned}$$

3

1410 Solve the following system of equations for x :

$$\begin{aligned} 2x + y &= 4 \\ x - 2y &= 7 \end{aligned}$$

3

1402 Solve the following system of equations for x :

$$\begin{aligned} 5x + y &= 19 \\ 2x + y &= 1 \end{aligned}$$

6

1395 Solve the following system of equations for x :

$$\begin{aligned} 2x + y &= 6 \\ x - y &= 3 \end{aligned}$$

3

1394 Solve the following system of equations algebraically and check:

$$\begin{aligned} 4x - 5y &= 18 \\ 3x - 2y &= 10 \end{aligned}$$

$$\begin{aligned} x &= 2 \\ y &= -2 \end{aligned}$$

1389 Solve the following system of equations for x :

$$\begin{aligned} 2x + y &= 6 \\ 3x - y &= 4 \end{aligned}$$

2

1375 Solve the following system of equations for x :

$$\begin{aligned} 4x + 2y &= 9 \\ 3x - 2y &= 12 \end{aligned}$$

3

1355 Solve the following system of equations for x :

$$\begin{aligned} 3x - 2y &= 6 \\ -x + 2y &= 12 \end{aligned}$$

9

1354 Solve the following system of equations algebraically and check:

$$\begin{aligned} 4x + 3y &= 25 \\ 5x + 2y &= 33 \end{aligned}$$

$$\begin{aligned} x &= 7 \\ y &= -1 \end{aligned}$$

Check

1330 *a* Solve algebraically and check:

$$\begin{aligned} 2x + 3y &= -5 \\ 3x - 2y &= 12 \end{aligned}$$

b If the system of equations in part *a* were graphed, in which quadrant would the solution lie?

***a* (2,-3) or $x = 2, y = -3$**
***b* IV**

1314 Solve the following system of equations algebraically and check:

$$\begin{aligned} 2x + 5y &= -1 \\ -3x + y &= 10 \end{aligned}$$

(-3,1) or
 $x = -3, y = 1$

1311 Solve the following system of equations algebraically and check:

$$\begin{aligned} 3x - 2y &= 22 \\ 2x + 5y &= 2 \end{aligned}$$

(6,-2) or
 $x = 6, y = -2$

1306 Solve the following system of equations for x :

$$\begin{aligned} 3x + y &= 9 \\ -2x + y &= -1 \end{aligned}$$

2

1301 Solve the following system of equations for y :

$$\begin{aligned} 2x + y &= 2 \\ -2x - 3y &= -6 \end{aligned}$$

2

1296 Solve the following system of equations for x :

$$\begin{aligned} y &= 2x - 5 \\ x + y &= 4 \end{aligned}$$

3

1292 Solve the following system of equations for x :

$$\begin{aligned} 3x + y &= 11 \\ 2x - y &= -1 \end{aligned}$$

2

1287 Solve the following system of equations for x :

$$\begin{aligned} 3x + 2y &= 21 \\ 2y &= 18 \end{aligned}$$

1

1282 What is the solution for the following system of equations?

$$\begin{aligned} 2x + y &= 7 \\ x - 2y &= 6 \end{aligned}$$

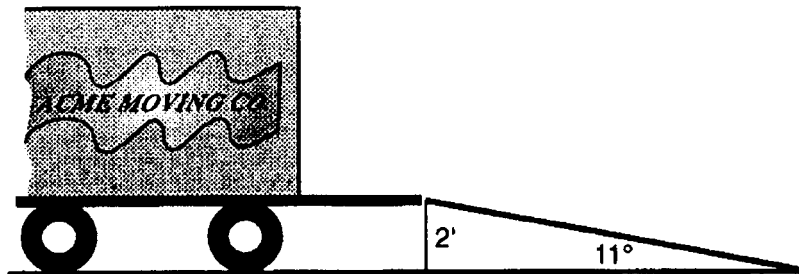
- (1) (3,1) (3) (-1,4)
(2) (1,3) (4) (4,-1)

1276 Solve the following system of equations for x :

$$\begin{aligned} 2x + 3y &= 5 \\ 4x - 3y &= 1 \end{aligned}$$

1

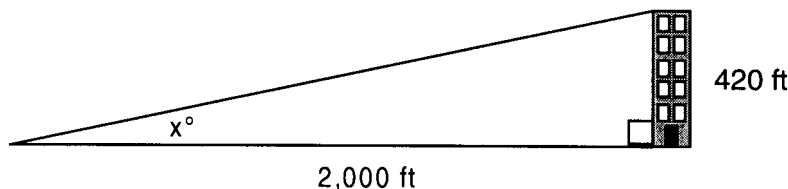
3424 The tailgate of a truck is 2 feet above the ground. The incline of a ramp used for loading the truck is 11° , as shown below.



Find, to the nearest tenth of a foot, the length of the ramp.

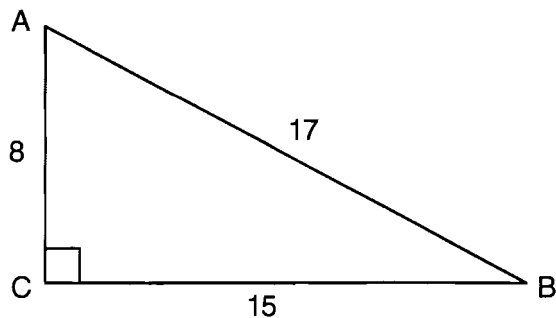
10.5 ft

3196 A person standing on level ground is 2,000 feet away from the foot of a 420-foot-tall building, as shown in the accompanying diagram. To the nearest degree, what is the value of x ?



12 and the equation $\tan x = \frac{420}{2000} = .21$ is shown.

4523 Right triangle ABC has legs of 8 and 15 and a hypotenuse of 17, as shown in the diagram below.



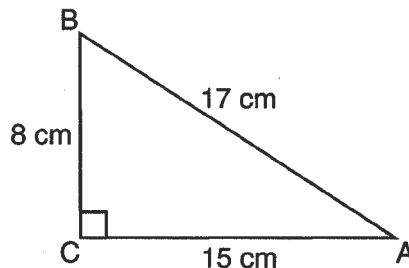
The value of the tangent of $\angle B$ is

- (1) 0.4706
- (2) **0.5333**
- (3) 0.8824
- (4) 1.8750

4455 In $\triangle ABC$, the measure of $\angle B = 90^\circ$, $AC = 50$, $AB = 48$, and $BC = 14$. Which ratio represents the tangent of $\angle A$?

- (1) $\frac{14}{50}$
- (2) **$\frac{14}{48}$**
- (3) $\frac{48}{50}$
- (4) $\frac{48}{14}$

4401 Which equation shows a correct trigonometric ratio for angle A in the right triangle below?



- (1) $\sin A = \frac{15}{17}$
- (2) $\tan A = \frac{8}{17}$
- (3) **$\cos A = \frac{15}{17}$**
- (4) $\tan A = \frac{15}{8}$

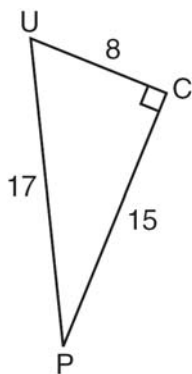
3616 A person measures the angle of depression from the top of a wall to a point on the ground. The point is located on level ground 62 feet from the base of the wall and the angle of depression is 52° . How high is the wall, to the nearest tenth of a foot?

79.4

3596 In the accompanying diagram, a ladder leaning against a building makes an angle of 58° with level ground. If the distance from the foot of the ladder to the building is 6 feet, find, to the nearest foot, how far up the building the ladder will reach.

10

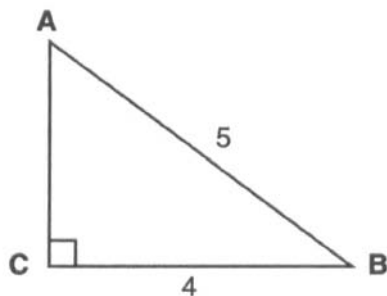
3813 The diagram below shows right triangle UPC .



Which ratio represents the sine of $\angle U$?

- (1) $\frac{15}{8}$
- (2) $\frac{15}{17}$
- (3) $\frac{8}{15}$
- (4) $\frac{8}{17}$

3651 Which equation could be used to find the measure of one acute angle in the right triangle shown below?



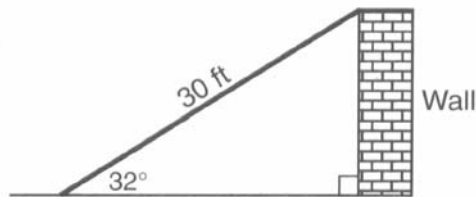
- (1) $\sin A = \frac{4}{5}$
- (2) $\tan A = \frac{5}{4}$
- (3) $\cos B = \frac{5}{4}$
- (4) $\tan B = \frac{4}{5}$

3603 For the following question, clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc.

A tree casts a shadow that is 20 feet long. The angle of elevation from the end of the shadow to the top of the tree is 66° . Determine the height of the tree, to the *nearest foot*.

45

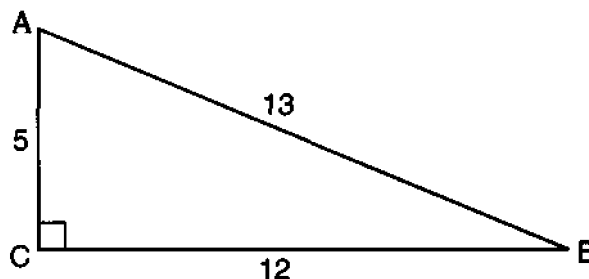
3627 The accompanying diagram shows a ramp 30 feet long leaning against a wall at a construction site.



If the ramp forms an angle of 32° with the ground, how high above the ground, to the *nearest tenth*, is the top of the ramp?

- (1) 15.9 ft
- (2) 18.7 ft
- (3) 25.4 ft
- (4) 56.6 ft

3590



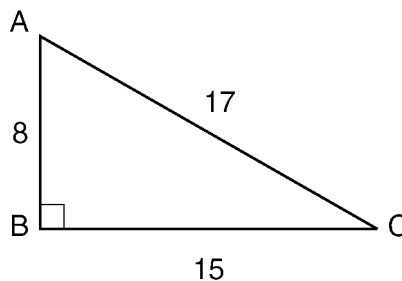
Which ratio represents $\cos A$ in the accompanying diagram of $\triangle ABC$?

- (1) $\frac{5}{13}$
- (2) $\frac{12}{13}$
- (3) $\frac{12}{5}$
- (4) $\frac{13}{5}$

3584 The angle of elevation from a point 25 feet from the base of a tree on level ground to the top of the tree is 30° . Which equation can be used to find the height of the tree?

- (1) $\tan 30^\circ = \frac{x}{25}$
- (2) $\cos 30^\circ = \frac{x}{25}$
- (3) $\sin 30^\circ = \frac{x}{25}$
- (4) $30^2 + 25^2 = x^2$

3577 In the accompanying diagram of right triangle ABC , $AB = 8$, $BC = 15$, $AC = 17$, and $m\angle ABC = 90$.



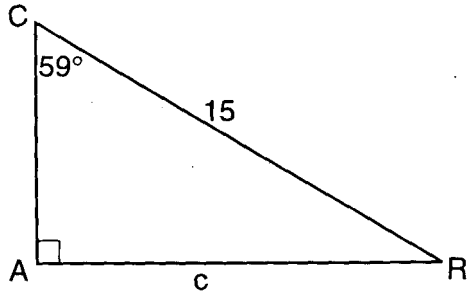
What is $\tan \angle C$?

- (1) $\frac{8}{15}$
- (2) $\frac{17}{15}$
- (3) $\frac{8}{17}$
- (4) $\frac{15}{17}$

3285 If $\tan A = \frac{3}{4}$, find $m\angle A$ to the *nearest degree*.

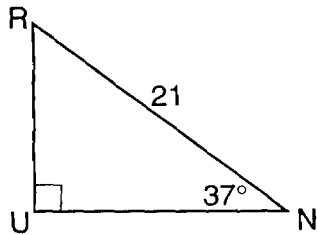
37°

3459 In the accompanying diagram of right triangle CAR , $m\angle A = 90$, $m\angle C = 59$, and $CR = 15$. If AR is represented by c , which equation can be used to find c ?



- (1) $\sin 59^\circ = \frac{c}{15}$
- (2) $\cos 59^\circ = \frac{c}{15}$
- (3) $\tan 59^\circ = \frac{c}{15}$
- (4) $\sin 31^\circ = \frac{c}{15}$

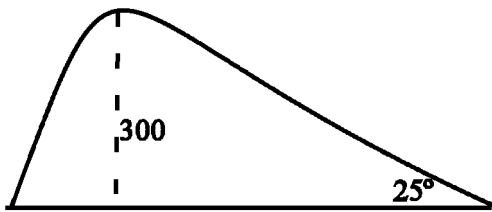
3455 In the accompanying diagram of right triangle RUN , $m\angle U = 90$, $m\angle N = 37$, and $RN = 21$.



What is the length of \overline{RU} , expressed to the nearest tenth?

- (1) 12.6
- (2) 15.8
- (3) 16.8
- (4) 34.9

3421 One side of a 300 foot tall hill rises at an angle of 25° to the horizon. What is the length, to the nearest foot, of a path running along that side of the hill, from the top to the bottom?

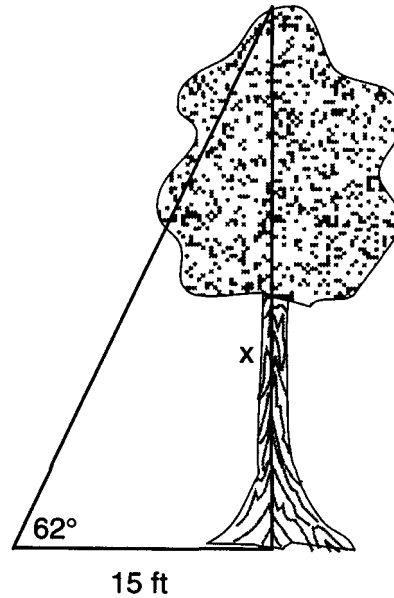


710 ft.

3302 If $\tan A = 0.4548$, find the measure of $\angle A$ to the nearest degree.

24°

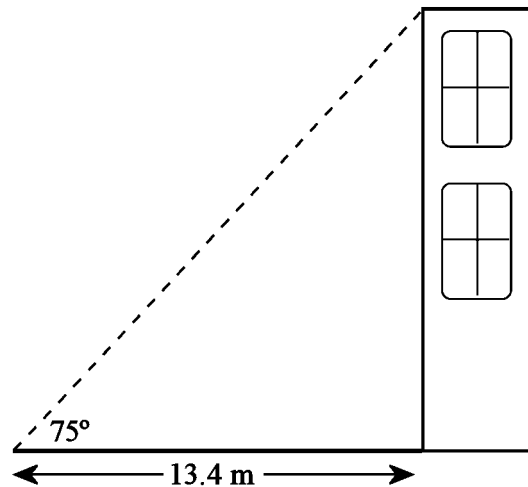
3442 Find, to the nearest tenth of a foot, the height of the tree represented in the accompanying diagram.



(Not drawn to scale)

28.2

3432 The shadow formed by a building is 13.4 meters. The angle formed at the tip of the shadow by the ground and the top of the building is 75° .



(not drawn to scale)

Find, to the nearest tenth of a meter, the height of the building.

50.0 m

3280 If $\sin A = 0.3642$, find the measure of $\angle A$ to the nearest degree.

21°

4448 What is the slope of the line that passes through the points (3,5) and (-2,2)?

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

4406 Which equation represents the line that passes through the points (-3,7) and (3,3)?

- (1) $y = \frac{2}{3}x + 1$
- (2) $y = \frac{2}{3}x + 9$
- (3) $y = -\frac{2}{3}x + 5$
- (4) $y = -\frac{2}{3}x + 9$

4207 What is an equation of the line that passes through the point (3,-1) and has a slope of 2?

- (1) $y = 2x + 5$
- (2) $y = 2x - 1$
- (3) $y = 2x - 4$
- (4) $y = 2x - 7$

4195 What is the slope of the line that passes through the points (-5,4) and (15,-4)?

- (1) $-\frac{2}{5}$
- (2) 0
- (3) $-\frac{5}{2}$
- (4) undefined

3881 Which equation represents the line whose slope is 2 and whose y-intercept is 6?

- (1) $y = 2x + 6$
- (2) $y = 6x + 2$
- (3) $2y + 6x = 0$
- (4) $y + 2x = 6$

3855 What is an equation of the line that passes through the point (4, -6) and has a slope of -3?

- (1) $y = -3x + 6$
- (2) $y = -3x - 6$
- (3) $y = -3x + 10$
- (4) $y = -3x + 14$

3827 The table below represents the number of hours a student worked and the amount of money the student earned.

Number of Hours (<i>h</i>)	Dollars Earned (<i>d</i>)
8	\$50.00
15	\$93.75
19	\$118.75
30	\$187.50

Write an equation that represents the number of dollars, *d*, earned in terms of the number of hours, *h*, worked.

Using this equation, determine the number of dollars the student would earn for working 40 hours.

$d = 6.25h$ and 250

3663 Write an equation that represents the line that passes through the points (5,4) and (-5,0).

$y = \frac{2}{5}x + 2$ or $y - 4 = \frac{2}{5}(x - 5)$

3807 What is the slope of the line that passes through the points (2,5) and (7,3)?

- (1) $-\frac{5}{2}$
- (2) $-\frac{2}{5}$
- (3) $\frac{8}{9}$
- (4) $\frac{9}{8}$

3804 What is an equation of the line that passes through the points (3,-3) and (-3,-3)?

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

3728 What is the midpoint of the line segment that joins points (4,-2) and (-2,5)?

- (1) $(1, \frac{3}{2})$
- (2) $(\frac{3}{2}, 3)$
- (3) $(1, \frac{7}{2})$
- (4) $(2, \frac{3}{2})$

3650 In a linear equation, the independent variable increases at a constant rate while the dependent variable decreases at a constant rate. The slope of this line is

- (1) zero
- (2) negative
- (3) positive
- (4) undefined

2856 What is the slope of the line that passes through the points (-6,1) and (4,-4)?

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

2834 The accompanying table shows the enrollment of a preschool from 1980 through 2000. Write a linear regression equation to model the data in the table.

Year (<i>x</i>)	Enrollment (<i>y</i>)
1980	14
1985	20
1990	22
1995	28
2000	37

$y = 1.08x - 2125$

2754 If a line is horizontal, its slope is

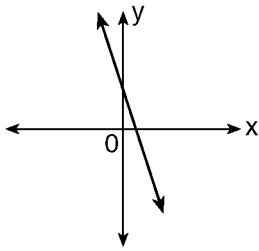
- (1) 1
- (2) 0
- (3) undefined
- (4) negative

2722 What is the y-intercept of the graph of the line whose equation is $y = -\frac{2}{5}x + 4$?

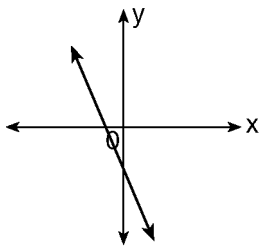
- (1) $-\frac{5}{2}$
- (2) $-\frac{2}{5}$
- (3) 0
- (4) 4

2329 Which diagram represents the graph of the equation $y = 2x - 1$?

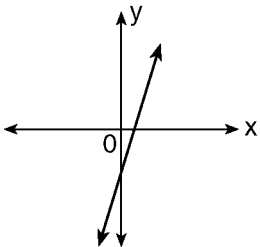
(1)



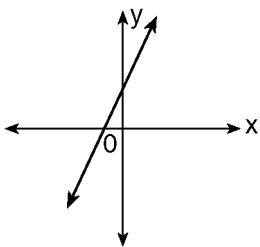
(2)



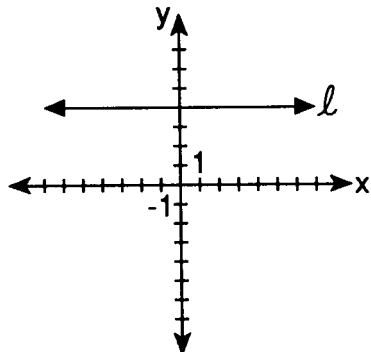
(3)



(4)



1432 Which equation is represented by this graph of line l ?

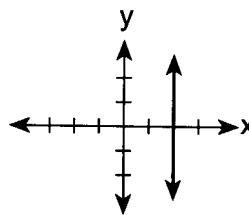


- (1) $x = y + 4$
- (2) $y = x + 4$

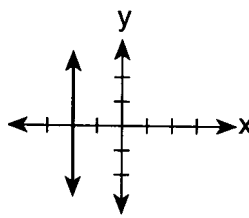
- (3) $x = 4$
- (4) $y = 4$

1522 Which graph represents the graph of the equation $x = 2$?

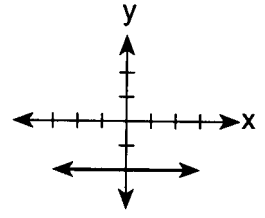
(1)



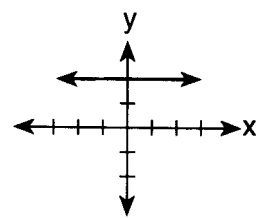
(2)



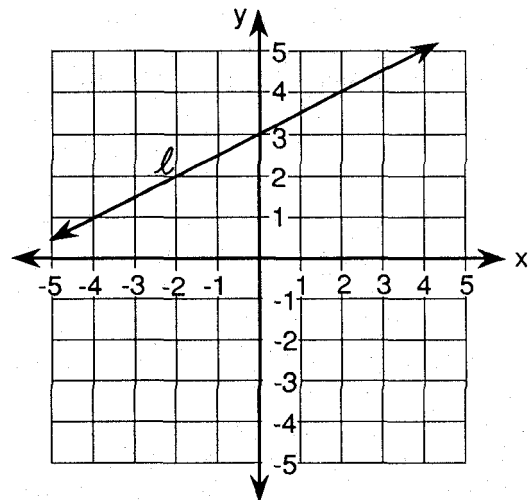
(3)



(4)



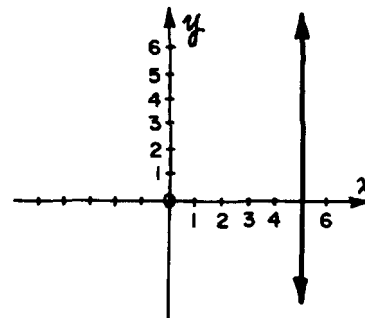
1397 Which equation represents line l , shown in the accompanying diagram?



- (1) $y = 2x + 3$
- (2) $y = \frac{1}{2}x + 3$

- (3) $y = 3x + \frac{1}{2}$
- (4) $y = 3x + 2$

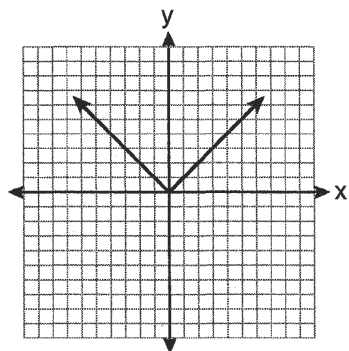
1173 The graph of which equation is shown in the accompanying diagram?



- (1) $x = 5$
- (2) $y = 5$

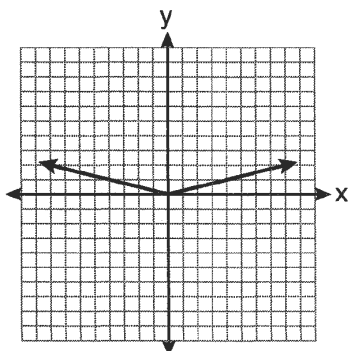
- (3) $y = 5x$
- (4) $y = x + 5$

4411 The graph of the equation $y = |x|$ is shown in the diagram below.

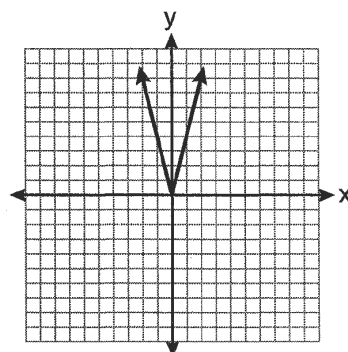


Which diagram could represent a graph of the equation $y = a/x$ when $-1 < a < 0$?

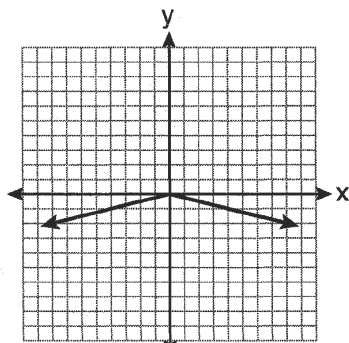
(1)



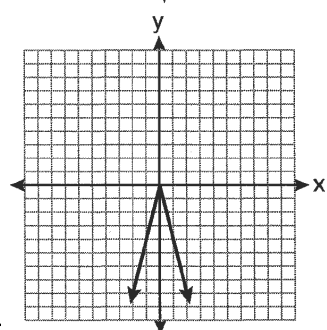
(2)



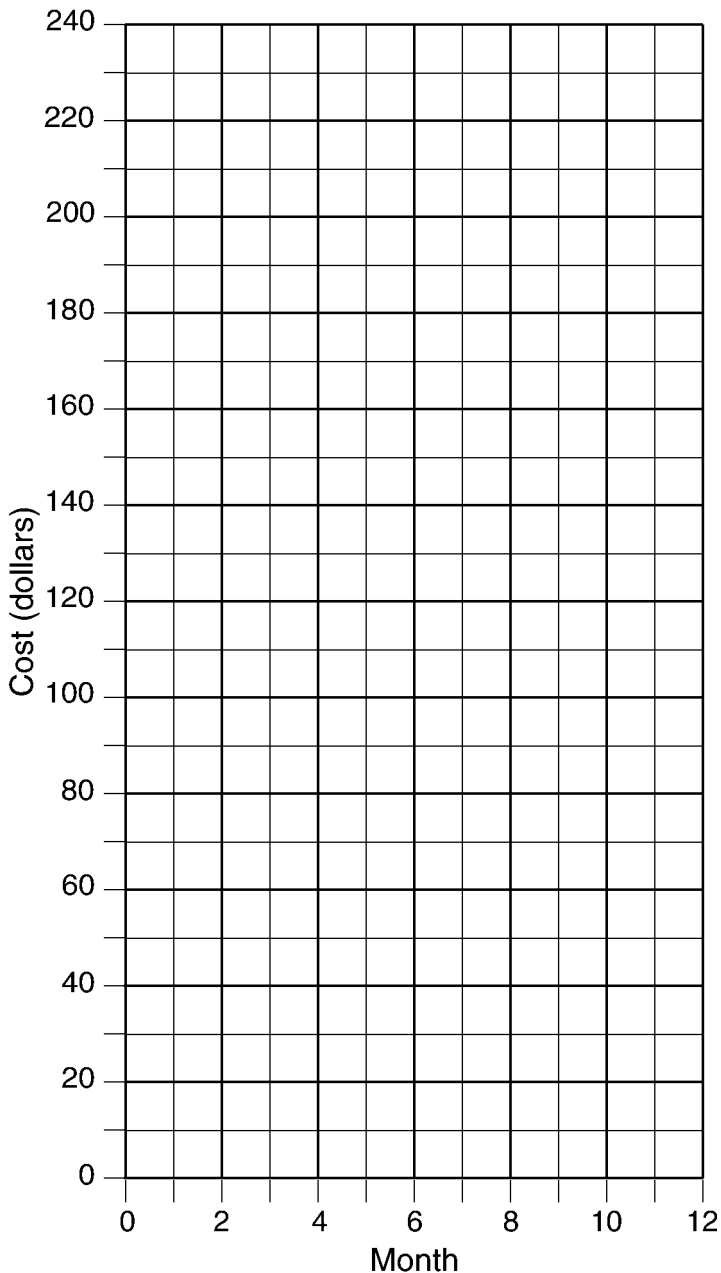
(3)



(4)



2448 At Ron's Rental, a person can rent a big-screen television for \$10 a month plus a one-time "wear-and-tear" fee of \$100. At Josie's Rental, the charge is \$20 a month and an additional charge of \$20 for delivery with no "wear-and-tear" fee.



a. If c equals the cost, write one equation representing the cost of the rental for m months at Ron's Rental and one equation representing the cost of the rental for m months at Josie's Rental.

b. On the accompanying grid, graph and label *each* equation.

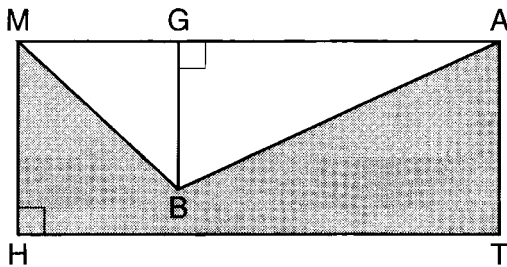
c. From your graph, determine in which month Josie's cost will equal Ron's cost.

$a. c = 10m + 100$ for Ron's Rental and $c = 20m + 20$ for Josie's Rental.

b. graph

c. 8

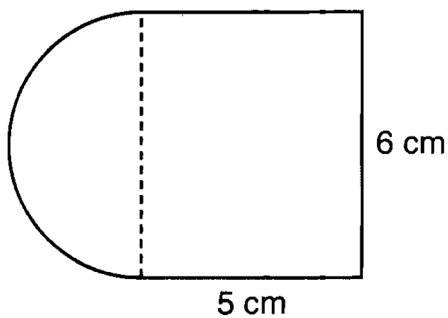
4516 In the diagram below, $MATH$ is a rectangle, $GB = 4.6$, $MH = 6$, and $HT = 15$.



What is the area of polygon $MBATH$?

- (1) 34.5
- (2) 55.5
- (3) 90.0
- (4) 124.5

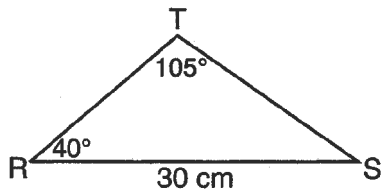
4475 A figure is made up of a rectangle and a semicircle as shown in the diagram below.



What is the area of the figure, to the nearest tenth of a square centimeter?

- (1) 39.4
- (2) 44.1
- (3) 48.8
- (4) 58.3

4442 In the diagram below of triangle RST , $RS = 30$ centimeters, $m\angle T = 105^\circ$, and $m\angle R = 40^\circ$. Find the area of triangle RST , to the nearest square centimeter.

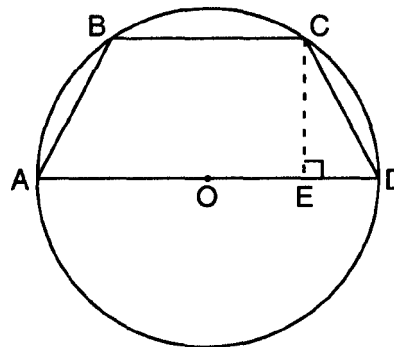


172

3612 The second side of a triangle is two more than the first side, and the third side is three less than the first side. Which expression represents the perimeter of the triangle?

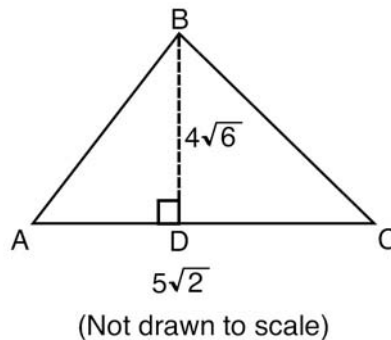
- (1) $x + 5$
- (2) $2x - 1$
- (3) $3x - 1$
- (4) $x^2 - x - 6$

3867 In the diagram below, the circumference of circle O is 16π inches. The length of \overline{BC} is three-quarters of the length of diameter \overline{AD} and $CE = 4$ inches. Calculate the area, in square inches, of trapezoid $ABCD$.



56

3700 In the accompanying diagram of $\triangle ABC$, altitude $BD = 4\sqrt{6}$ and $AC = 5\sqrt{2}$. Find the area of the triangle to the nearest tenth of a square unit



34.6

3617 Manuel plans to install a fence around the perimeter of his yard. His yard is shaped like a square and has an area of 40,000 square feet. The company that he hires charges \$2.50 per foot for the fencing and \$50.00 for the installation fee. What will be the cost of the fence, in dollars?

2,050

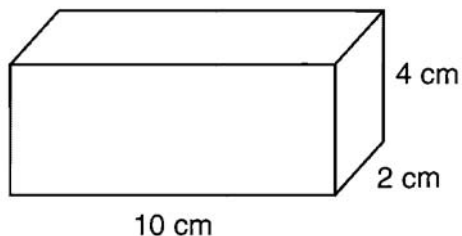
3611 What is the length of one side of the square whose perimeter has the same numerical value as its area?

- (1) 5
- (2) 6
- (3) 3
- (4) 4

2992 The area of a square is 81. Find the perimeter.

36

4532 Find the volume, in cubic centimeters, and the surface area, in square centimeters, of the rectangular prism shown below.



Volume = 80cm^3 Surface area = 136cm^2

3830 A soup can is in the shape of a cylinder. The can has a volume of 342 cm^3 and a diameter of 6 cm.

Express the height of the can in terms of π .

Determine the maximum number of soup cans that can be stacked on their base between two shelves if the distance between the shelves is exactly 36 cm. Explain your answer.

38 and 2
 π

3669 A block of wood is 5 inches long, 2 inches wide, and 3 inches high. What is the volume of this block of wood?

- (1) 10 in^3 (3) 30 in^3
(2) 25 in^3 (4) 38 in^3

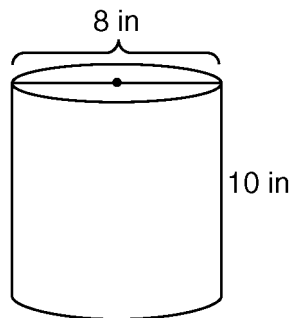
3613 The formula for the volume of a right circular cylinder is $V = \pi r^2 h$. The value of h can be expressed as

- (1) $\frac{V}{\pi} r^2$ (3) $\frac{\pi r^2}{V}$
(2) $\frac{V}{\pi r^2}$ (4) $V - \pi r^2$

3589 Which diagram represents the figure with the greatest volume?

- (1) (2)
(3) (4)

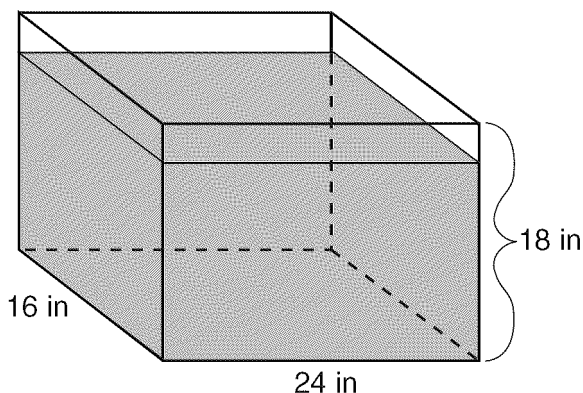
3599 A storage container in the shape of a right circular cylinder is shown in the accompanying diagram.



What is the volume of this container, to the nearest hundredth?

- (1) 56.55 in^3 (3) 251.33 in^3
(2) 125.66 in^3 (4) **502.65 in^3**

3597



As shown in the accompanying diagram, the length, width, and height of Richard's fish tank are 24 inches, 16 inches, and 18 inches, respectively. Richard is filling his fish tank with water from a hose at the rate of 500 cubic inches per minute. How long will it take, to the nearest minute, to fill the tank to a depth of 15 inches?

12 minutes

3585 A box in the shape of a cube has a volume of 64 cubic inches. What is the length of a side of the box?

- (1) $21.\bar{3}\text{ in}$ (3) 8 in
(2) 16 in (4) **4 in**

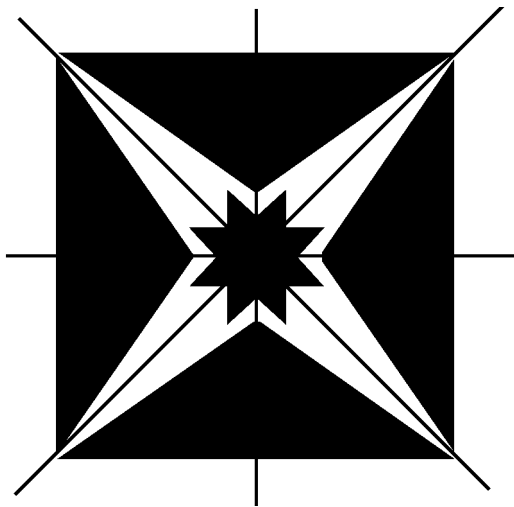
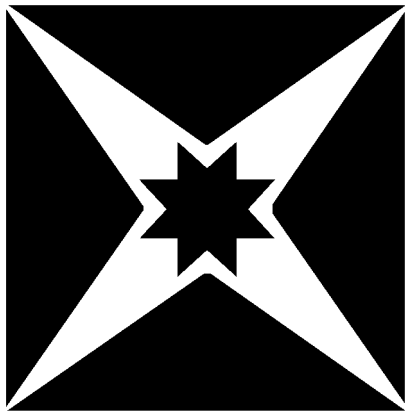
3574 Tina's preschool has a set of cardboard building blocks, each of which measures 9 inches by 9 inches by 4 inches. How many of these blocks will Tina need to build a wall 4 inches thick, 3 feet high, and 12 feet long?

64, and appropriate work is shown, such as calculating $\frac{36 \times 144}{(9 \times 9)}$ or drawing a labeled diagram.

3551 If the diameter of a cylindrical soda can is doubled, then the volume of the can is multiplied by

- (1) 2 (3) **4**
(2) 3 (4) 5

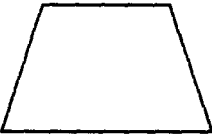

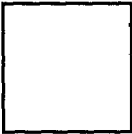
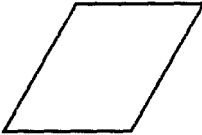
3406 Draw all lines of symmetry on the figure below.



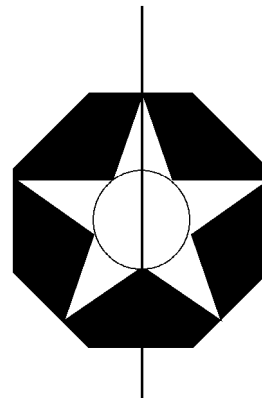
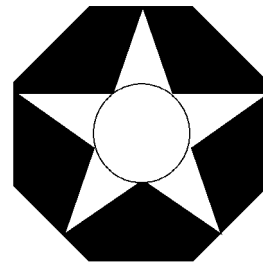
3341 Which equation represents the axis of symmetry of the graph of the equation $y = -x^2 + 4x - 2$?

- (1) $x = 2$
- (2) $y = 2$
- (3) $x = -2$
- (4) $y = -2$

3220 Which geometric figure has one and only one line of symmetry?

- (1)  Isosceles trapezoid
- (2)  Rectangle
- (3)  Square
- (4)  Rhombus

3404 Draw all lines of symmetry on the figure below.



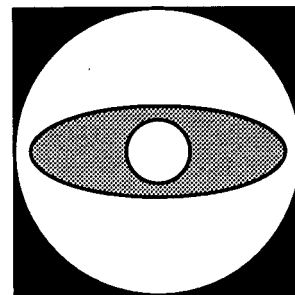
3214 Which figure does *not* always possess line symmetry?

- (1) square
- (2) rectangle
- (3) circle
- (4) parallelogram

3207 Which letter has horizontal but does not have vertical line symmetry?

- (1) B
- (2) W
- (3) O
- (4) N

3189 Draw all the symmetry lines in the accompanying figure.



3183 What type of symmetry does a square have?

- (1) point symmetry, only
- (2) line symmetry, only
- (3) both point and line symmetry
- (4) neither line nor point symmetry

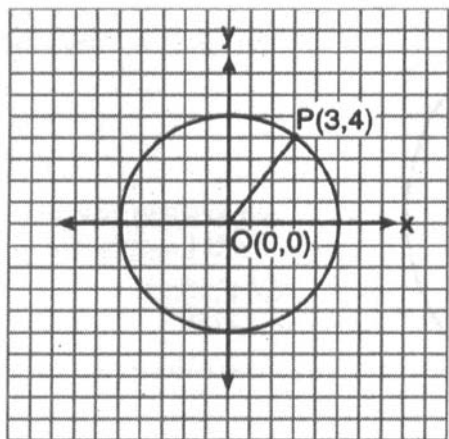
3172 Which letter does not have a line of symmetry?

- (1) S
- (2) O
- (3) X
- (4) H

3776 Phil is cutting a triangular piece of tile. If the triangle is scalene, which set of numbers could represent the lengths of the sides?

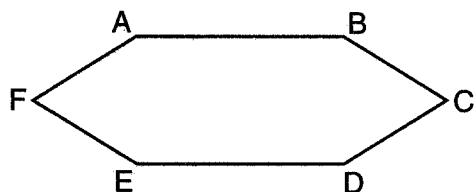
- (1) {2,4,7} (3) {3,5,8}
 (2) {4,5,6} (4) {5,5,8}

3769 In the accompanying diagram, the center of circle O is $(0,0)$, and the coordinates of Point P are $(3,4)$. If \overline{OP} is a radius, what is the equation of the circle?



- (1) $x^2 + y^2 = 5$ (3) $x^2 + y^2 = 16$
 (2) $x^2 + y^2 = 9$ (4) $x^2 + y^2 = 25$

3708 Which type of figure is shown in the accompanying diagram?



- (1) hexagon (3) pentagon
 (2) octagon (4) quadrilateral

3694 Which set of numbers could be the lengths of the sides of a right triangle?

- (1) {10,24,26} (3) {3,4,6}
 (2) {12,16,30} (4) {4,7,8}

3607 A builder is building a rectangular deck with dimensions of 16 feet by 30 feet. To ensure that the sides form 90° angles, what should each diagonal measure?

- (1) 16 ft (3) 34 ft
 (2) 30 ft (4) 46 ft

3484 A base angle of an isosceles triangle measures 30° , and the length of one of the legs is 12. What is the length of the altitude drawn to the base of the triangle?

- (1) $6\sqrt{3}$ (3) 6
 (2) 12 (4) 9

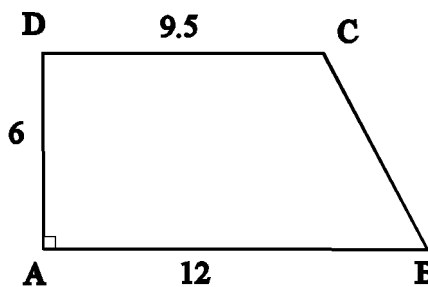
3454 Find, to the nearest degree, the measure of a base angle of an isosceles triangle whose sides have lengths 12, 12, and 15.

51

3412 What is the length, to the nearest foot of the base of an isosceles triangle if the length of the two congruent sides is 12 feet and the vertex angle measures 70° ? (Hint: draw an altitude)

14 feet

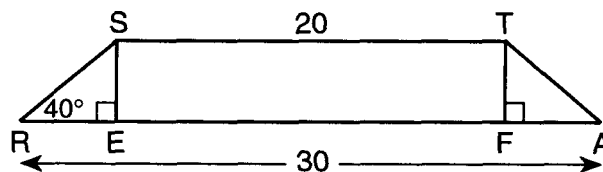
3397 A box is made in the with a cross section in the shape of a right trapezoid as shown in the diagram below. $AB = 12$ feet, $AD = 6$ feet and $CD = 9.5$ feet.



The material used to make the box cannot be bent into angles less than 65° without breaking. Can this box be made from one complete piece of this material. Explain.

yes

3342 In the accompanying diagram, STAR is an isosceles trapezoid with $\overline{SR} \cong \overline{TA}$, $ST = 20$, $RA = 30$, $m\angle SRA = 40^\circ$, and altitudes \overline{SE} and \overline{TF} are drawn.



- a Find SE to the nearest tenth.
 b Find SR to the nearest tenth.
 c Find the perimeter of trapezoid STAR to the nearest integer.
 d Find the area of trapezoid STAR to the nearest integer.
a 4.2 b 6.5 c 63 d 105

3338 Trapezoid $ABCD$, which has coordinates $A(0,9)$, $B(12,9)$, $C(8,4)$, and $D(0,4)$.

Find $m\angle ABC$ to the nearest degree.

51°

2792 The perimeter of a square is 56. Express the length of a diagonal of the square in simplest radical form.

$14\sqrt{2}$

3739 Kimberly rides her bicycle from her home to school at an average rate of 12 miles per hour. If it takes her 20 minutes to get to school, how many miles is her home from her school?

4

4346 How long will it take an object to move 100 meters if the object is traveling with an average speed of 0.5 meter per second?

- (1) **200 s** (3) 5 s
(2) 2 s (4) 50 s

4345 What is the average velocity of a car that travels 30. kilometers due west in 0.50 hour?

- (1) 15 km/hr (3) 15 km/hr west
(2) 60. km/hr (4) **60. km/hr west**

4344 The average speed of a plane was 600 kilometers per hour. How long did it take the plane to travel 120 kilometers?

- (1) **0.2 hour** (3) 0.7 hour
(2) 0.5 hour (4) 5 hours

4343 A car travels between the 100.-meter and 250.-meter highway markers in 10. seconds. The average speed of the car during this interval is

- (1) 10. m/s (3) 25 m/s
(2) **15 m/s** (4) 35 m/s

4342 A baseball pitcher throws a fastball at 42 meters per second. If the batter is 18 meters from the pitcher, approximately how much time does it take for the ball to reach the batter?

- (1) 1.9 s (3) 0.86 s
(2) 2.3 s (4) **0.43 s**

4341 A car travels 20. meters east in 1.0 second. The displacement of the car at the end of this 1.0-second interval is

- (1) 20. m (3) **20. m east**
(2) 20. m/s (4) 20. m/s east

4340 A car travels a distance of 98 meters in 10. seconds. What is the average speed of the car during this 10.-second interval?

- (1) 4.9 m/s (3) 49 m/s
(2) **9.8 m/s** (4) 98 m/s

4339 A runner completed the 100.-meter dash in 10.0 seconds. Her average speed was

- (1) 0.100 m/s (3) 100. m/s
(2) **10.0 m/s** (4) 1,000 m/s

4338 A cart starting from rest travels a distance of 3.6 meters in 1.8 seconds. The average speed of the cart is

- (1) 0.20 m/s (3) 0.50 m/s
(2) **2.0 m/s** (4) 5.0 m/s

4337 What is the distance traveled by an object that moves with an average speed of 6.0 meters per second for 8.0 seconds?

- (1) 0.75 m (3) 14 m
(2) 1.3 m (4) **48 m**

4335 An object moves a distance of 10 meters in 5 seconds. The average speed of the object is

- (1) 0.5 m/sec (3) 40 m/sec
(2) **2.0 m/sec** (4) 50 m/sec

4336 The average speed of a runner in a 400.-meter race is 8.0 meters per second. How long did it take the runner to complete the race?

- (1) 80. sec (3) 40. sec
(2) **50. sec** (4) 32. sec

4334 The average velocity of an object during 6.0 seconds is 2 meters per second. What is the total distance traveled by the object?

- (1) $\frac{1}{3}$ m (3) 3 m
(2) **12 m** (4) 4 m

4333 If a car is traveling at an average speed of 60 kilometers per hour, how long does it take to travel 12 kilometers?

- (1) **0.2 hour** (3) 0.72 hour
(2) 0.5 hour (4) 5.0 hours

4332 An object starts from rest and accelerates uniformly down an incline. If the object reaches a speed of 40 meters per second in 5 seconds, its average speed is

- (1) 8 m/sec (3) **20 m/sec**
(2) 10 m/sec (4) 30 m/sec

4276 There are 5,280 feet in a mile. There are 3 feet in a yard. There are 91.5 centimeters in a yard. How many meters are in $\frac{3}{4}$ of a mile, to the nearest meter?

- (1) **1,208** (3) 12,074
(2) 1,610 (4) 16,090

3751 Andy drives 80 miles to get to the Thruway, drives 100 miles on the Thruway, and then drives an additional 75 miles after leaving the Thruway. If the entire trip took 5 hours and he made no stops, what was his average speed, in miles per hour?

- (1) **51** (3) 250
(2) 65 (4) 255

3658 In a game of ice hockey, the hockey puck took 0.8 second to travel 89 feet to the goal line. Determine the average speed of the puck in feet per second.

111.25 ft/sec or $111\frac{1}{4}$ ft/sec

2783 Mario paid \$44.25 in taxi fare from the hotel to the airport. The cab charged \$2.25 for the first mile plus \$3.50 for each additional mile. How many miles was it from the hotel to the airport?

- (1) 10 (3) 12
(2) 11 (4) **13**

- 4282 About how long is 7.62 meters in feet?
 (1) 3 ft (3) **25 ft**
 (2) 19 ft (4) 91 ft
- 4281 A 12 inch ruler is divided into 3 pieces. How long is each piece in centimeters?
 (1) 4.00 cm (3) 30.48 cm
 (2) **10.16 cm** (4) 36.00 cm
- 4280 A steel rod of 1.25 feet was cut into 5 equal pieces. How many long was each piece in inches?
 (1) 0.25 in (3) **3.00 in**
 (2) 2.40 in (4) 15.00 in
- 4279 Three sticks, measuring 8 inches, 9 inches, and 10 inches, are connected end to end. How long are they when put all together?
 (1) **2 feet 3 inches** (3) 2 feet 7 inches
 (2) 2 feet 4 inches (4) 2 feet 8 inches
- 4278 A grass field has dimensions 450 yards by 935 yards. Which of the following is closest to the dimensions in miles?
 (1) 0.028 mi. \times 0.059 mi. (3) 0.232 mi \times 0.482 mi.
 (2) 0.085 mi. \times 0.177 mi. (4) **0.256 mi. \times 0.531 mi.**
- 4277 A room measures 4 meters by 8 meters. Find the dimensions in centimeters.
 (1) 0.04 cm \times 0.08 cm (3) 40 cm \times 80 cm
 (2) 0.4 cm \times 0.8 cm (4) **400 cm \times 800 cm**
- 4275 There are 5,280 feet in a mile. There are 3 feet in a yard. How many feet are in $\frac{3}{4}$ of a mile?
 (1) 1,320 (3) **3,960**
 (2) 1,760 (4) 5,280
- 4274 There are 5,280 feet in a mile. There are 3 feet in a yard. How many yards are in $\frac{3}{4}$ of a mile?
 (1) **1,320** (3) 3,960
 (2) 1,760 (4) 5,280
- 4273 What is 4 meters expressed in kilometers?
 (1) **0.004 kilometers** (3) 40 kilometers
 (2) 0.04 kilometers (4) 4,000 kilometers
- 4272 What is 4 meters expressed in millimeters?
 (1) 0.004 millimeters (3) 40 millimeters
 (2) 0.04 millimeters (4) **4,000 millimeters**
- 4271 Karen the Kitten weighs 58 ounces. What is its weight in pounds and ounces?
 (1) 3 pounds 4 ounces (3) 4 pounds 10 ounces
 (2) **3 pounds 10 ounces** (4) 5 pounds 8 ounces
- 4270 Jose has a 1 quart pitcher.
 Approximately how many pitchers of water will Jose have to empty into his fish tank to have at least 10 gallons of water?
 (1) 5 (3) **40**
 (2) 20 (4) 60
- 4269 A man who is 72 inches tall is
 (1) 5 feet 10 inches tall. (3) 6 feet 4 inches tall.
 (2) **6 feet 0 inches tall.** (4) 7 feet 2 inches tall.
- 4268 A drink contains 4 ounces of orange juice, 1 pint of cranberry juice, and 12 ounces of pineapple juice. How much liquid is contained in the drink?
 (1) 24 ounces (3) **1 quart**
 (2) 1.5 pints (4) 1 quart and 1 pint
- 4267 Which of the following lengths is shortest?
 (1) 40 millimeters (3) 0.04 meters
 (2) **0.4 centimeters** (4) 0.0004 kilometers
- 4266 Convert: 3 yards = ___ inches
 (1) 12 (3) 72
 (2) 36 (4) **108**
- 4265 Convert: 4 gallons = ___ quarts
 (1) 4 (3) 12
 (2) 8 (4) **16**
- 4264 How can 3 yards also be written?
 (1) 1 foot (3) 6 feet
 (2) 3 feet (4) **9 feet**
- 2821 If a United States dollar is worth \$1.41 in Canadian money, how much is \$100 in Canadian money worth in United States money, to the *nearest cent* ?
70.92
- 2804 Andy is 6 feet tall. If 1 inch equals 2.54 centimeters, how tall is Andy, to the *nearest centimeter*?
 (1) 15 (3) **183**
 (2) 30 (4) 213
- 2790 The formula $C = \frac{5}{9}(F - 32)$ is used to convert Fahrenheit temperature, F , to Celsius temperature, C . What temperature, in degrees Fahrenheit, is equivalent to a temperature of 10° Celsius?
50

- 4206 Carrie bought new carpet for her living room. She calculated the area of the living room to be 174.2 square feet. The actual area was 149.6 square feet. What is the relative error of the area to the *nearest ten-thousandth*?
 (1) 0.1412 (3) 1.8588
 (2) **0.1644** (4) 2.1644
- 3861 To calculate the volume of a small wooden cube, Ezra measured an edge of the cube as 2 cm. The actual length of the edge of Ezra's cube is 2.1 cm. What is the relative error in his volume calculation to the *nearest hundredth*?
 (1) 0.13 (3) 0.15
 (2) **0.14** (4) 0.16

- 4230 Aaron measures his rectangular doorway for a new door. He measures the doorway to be 7 feet by 2 feet. The actual measurements of the doorway are 6.5 feet by 1.8 feet.

Using the measurements that Aaron took, determine the number of square feet in area of the doorway.

Determine the number of square inches in actual area of the doorway.

Determine the relative error in calculating the area. Express your answer as a decimal to the *nearest thousandth*.

14 square feet and 11.7 square feet and 0.197

- 3828 Sarah measures her rectangular bedroom window for a new shade. Her measurements are 36 inches by 42 inches. The actual measurements of the window are 36.5 inches by 42.5 inches.

Using the measurements that Sarah took, determine the number of square inches in the area of the window.

Determine the number of square inches in the actual area of the window.

Determine the relative error in calculating the area. Express your answer as a decimal to the *nearest thousandth*.

1,512 and 1,551.25 and 0.025

- 4520 Corinne calculated the area of a paper plate to be 50.27 square inches. If the actual area of the plate is 55.42 square inches, what is the relative error in calculating the area, to the *nearest thousandth*?

(1) 0.092 (3) 0.102
(2) **0.093** (4) 0.103

- 4479 Alexis calculates the surface area of a gift box as 600 square inches. The actual surface area of the gift box is 592 inches. Find the relative error of Alexis' calculation expressed as a decimal to the *nearest thousandth*.

0.014

- 4478 Alexis calculates the surface area of a gift box as 600 square inches. The actual surface area of the gift box is 592 inches. Find the relative error of Alexis' calculation expressed as a decimal to the *nearest thousandth*.

- 4434 Using his ruler, Howell measured the sides of a rectangular prism to be 5 cm by 8 cm by 4 cm. The actual measurements are 5.3 cm by 8.2 cm by 4.1 cm. Find Howell's relative error in calculating the volume of the prism, to the *nearest thousandth*.

0.102

- 4228 Megan wanted to purchase a poster to put on her bedroom door. She calculated the area of the door to be 14 square feet. The actual area was 12.4 square feet. What is the relative error of the area to the *nearest ten-thousandth*?

(1) 0.12903 (4) 0.13
(2) **0.1290** (5) 0.131
(3) 0.1291

- 4227 Mindy wanted to buy a couch for her living room. So she calculated the length of the space where the couch could go to be 29.7 feet. The actual length was 25.1 feet. What is the relative error of the area to the *nearest hundredth*?

(1) 0.182 (3) 0.183
(2) 0.19 (4) **0.18**

- 4226 Robbie bought a blanket for his bed. He calculated the area of the blanket to be 15.2 square feet. The actual area was 12.2 square feet. What is the relative error of the area to the *nearest ten-thousandth*?

(1) .2457 (3) 0.2460
(2) 0.246 (4) **0.2459**

- 4225 Salvatore bought poster board for a school assignment. He calculated the area of the poster board to be 22.4 square feet. The actual area was 12.6 square feet. What is the relative error of the area to the *nearest tenth*?

(1) 0.78 (3) 0.7
(2) **0.8** (4) 0.77

- 4224 Amanda wanted to buy a swimming pool for her backyard. She needed to make sure that it would fit, so she calculated the area of her backyard. She measured it to be 55.1 square feet. The actual measure was 62.3 square feet. What is the relative error of the length to the *nearest hundred thousandth*?

(1) 0.1156 (3) **0.11557**
(2) 0.115569 (4) 0.12557

- 4223 William wanted to buy a desk for his new office. He needed to make sure that it would fit so he calculated the the length of the space. He measured it to be 4.1 feet. The actual length was 3.8 feet. What is the relative error of the length to the *nearest thousandth*?

(1) 0.07 (3) 0.078
(2) 0.08 (4) **0.079**

- 4222 Rachel bought wallpaper for a wall in her kitchen. She calculated the area of the wall to be 56.4 square feet. The actual area was 50.6 square feet. What is the relative error of the area to the *nearest ten-thousandth*?

(1) **0.1146** (3) 0.1147
(2) 0.1246 (4) 0.1145

3742 Max is paid a salary of \$225 a week plus 2.5% commission on his total sales.

Write an equation for P , Max's pay for one week, in terms of T , his weekly total sales.

Use this equation to determine his total pay for a week in which his total sales are \$4,650.

$P = 225 + 0.025T$ and **341.25**

4504 In a recent town election, 1,860 people voted for either candidate A or candidate B for the position of supervisor. If candidate A received 55% of the votes, how many votes did candidate B receive?

- (1) 186
- (2) **837**
- (3) 1,023
- (4) 1,805

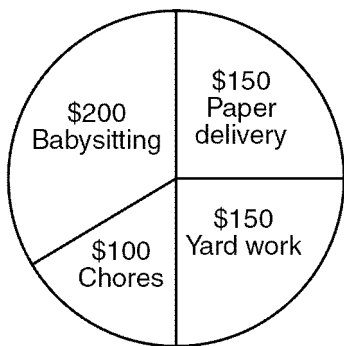
2788 A 14-gram serving of mayonnaise contains 11 grams of fat. What percent of the mayonnaise, to the nearest tenth of a percent, is fat?

78.6%

2734 The Edison Lightbulb Company tests 5% of their daily production of lightbulbs. If 500 bulbs were tested on Tuesday, what was the total number of bulbs produced that day?

- (1) 25
- (2) 1,000
- (3) **10,000**
- (4) 100,000

2726 The accompanying circle graph shows how Shannon earned \$600 during her summer vacation.



What is the measure of the central angle of the section labeled "Chores"?

- (1) 30°
- (2) **60°**
- (3) 90°
- (4) 120°

2615 A farmer has a rectangular field that measures 100 feet by 150 feet. He plans to increase the area of the field by 20%. He will do this by increasing the length and width by the same amount, x . Which equation represents the area of the new field?

- (1) $(100 + 2x)(150 + x) = 18,000$
- (2) $2(100 + x) + 2(150 + x) = 15,000$
- (3) **$(100 + x)(150 + x) = 18,000$**
- (4) $(100 + x)(150 + x) = 15,000$

2126 If 75% of a number is 60, what is the number?

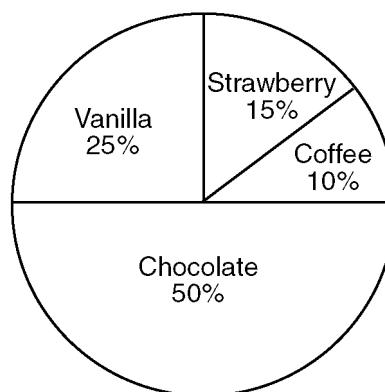
80

2612 Rashawn bought a CD that cost \$18.99 and paid \$20.51, including sales tax. What was the rate of the sales tax?

- (1) 5%
- (2) 2%
- (3) 3%
- (4) **8%**

2466 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?

Favorite Ice Cream Flavors



2

2463 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

2279 A factory packs CD cases into cartons for a music company. Each carton is designed to hold 1,152 CD cases. The Quality Control Unit in the factory expects an error of less than 5% over or under the desired packing number. What is the *least* number and the *most* number of CD cases that could be packed in a carton and still be acceptable to the Quality Control Unit?

1,095 and 1,209

2271 A boy got 50% of the questions on a test correct. If he had 10 questions correct out of the first 12, and 4 of the remaining questions correct, how many questions were on the test?

- (1) 16
- (2) 24
- (3) 26
- (4) **28**

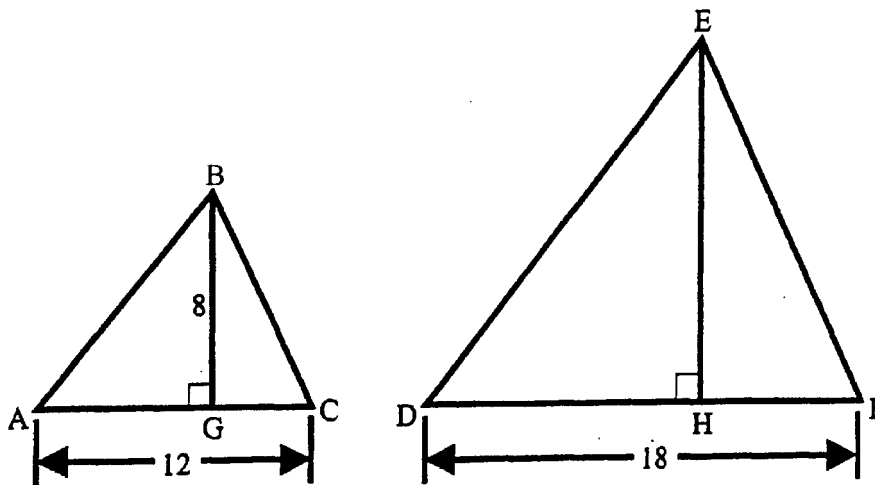
1691 If 60% of a number is 144, what is the number?

240

1541 Alice bought supplies for \$40.00. If the sales tax is 7% what was the total cost?

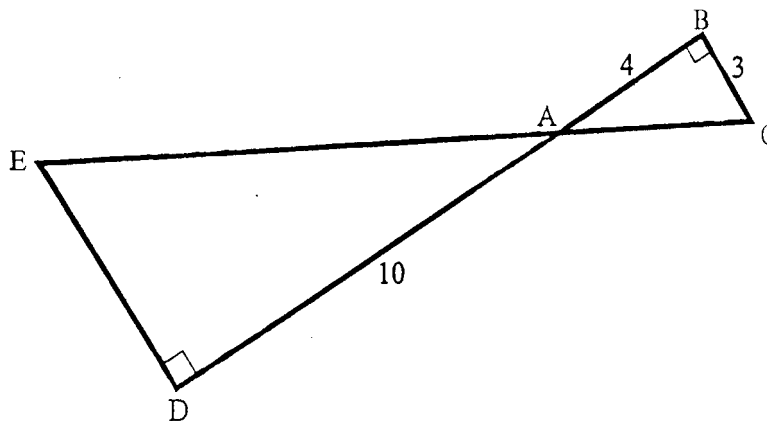
- (1) **\$2.80**
- (2) \$37.20
- (3) \$42.80
- (4) \$47.00

2310 In the accompanying diagrams, $\triangle ABC$ is similar to $\triangle DEF$. \overline{BG} is perpendicular to \overline{AC} and \overline{EH} is perpendicular to \overline{DF} .



- a What is the length of \overline{EH} ?
 - b What percentage of the area of $\triangle DEF$ is the area of $\triangle ABC$?
- a $\frac{8}{12} = \frac{EH}{18}$ $EH = 12$
- b $A = \frac{1}{2}b \times h$
- $A = 44.4\%$ or an equivalent answer

2308 In the diagram below, $\triangle AEDA$ and $\triangle ABC$ are right triangles, $DA = 10$, $AB = 4$, $BC = 3$, $m\angle EDA = 90^\circ$, and $m\angle ABC = 90^\circ$.



- a What is the length of \overline{ED} ?
 - b What is the length of \overline{AE} ?
- a $\triangle ADE \approx \triangle ABC$ so $\frac{10}{4} = \frac{ED}{3}$ so $ED = \frac{30}{4} = 7.5$
- b $\triangle ADE$ is a right triangle with legs 7.5 and 10.
length of $\overline{AE} = 12.5$

2555 A triangle has sides whose lengths are 5, 12, and 13. A similar triangle could have sides with lengths of
 (1) 3, 4, and 5 (3) 7, 24, and 25
 (2) 6, 8, and 10 (4) 10, 24, and 26

2277 If a girl 1.2 meters tall casts a shadow 2 meters long, how many meters tall is a tree that casts a shadow 75 meters long at the same time?
 45

1558 A booklet contains 30 pages. If 9 pages in the booklet have drawings, what percent of the pages in the booklet have drawings?
 (1) 30%
 (2) 9%
 (3) 3%
 (4) $\frac{3}{10}$ %

- 3657 The faces of a cube are numbered from 1 to 6. If the cube is tossed once, what is the probability that a prime number or a number divisible by 2 is obtained?
- (1) $\frac{6}{6}$
 (2) $\frac{5}{6}$
 (3) $\frac{4}{6}$
 (4) $\frac{1}{6}$
- 2623 A board game has a spinner on a circle that has seven equal sectors, numbered 1, 2, 3, 4, 5, 6 and 7. What is the probability of spinning an even number?
- (1) $\frac{3}{7}$ (3) $\frac{4}{7}$
 (2) $\frac{1}{2}$ (4) $\frac{7}{3}$
- 2196 The probability that a red block is selected from a bucket is $\frac{3}{8}$, and the probability that a blue block is selected is $\frac{2}{8}$. What is the probability that a red block or a blue block is selected?
- (1) 1
 (2) $\frac{1}{2}$
 (3) $\frac{5}{8}$
 (4) $\frac{6}{8}$
- 2096 David has 7 blue pens, 6 black pens, and 5 red pens in his desk drawer. If he selects a pen at random, what is the probability that it will be either blue or black?
- (1) $\frac{13}{18}$
 (2) $\frac{12}{18}$
 (3) $\frac{7}{18}$
 (4) $\frac{11}{18}$
- 2083 A bag contains five green, six red, and seven black jelly beans. If one jelly bean is drawn at random, what is the probability that the jelly bean is green or red?
- (1) $\frac{5}{18}$
 (2) $\frac{6}{18}$
 (3) $\frac{7}{18}$
 (4) $\frac{11}{18}$
- 1923 A single card is drawn from a standard deck of 52 cards. What is the probability the card is a five or a diamond?
- (1) $\frac{17}{52}$
 (2) $\frac{15}{52}$
 (3) $\frac{16}{52}$
 (4) $\frac{18}{52}$
- 1915 Emily has 5 lemon gumdrops, 8 strawberry gumdrops, and 7 grape gumdrops. If she selects one gumdrop at random, what is the probability that it will be either lemon or strawberry?
- (1) $\frac{13}{20}$
 (2) $\frac{13}{20}$
 (3) $\frac{6}{52}$
 (4) $\frac{6}{26}$
- 1898 From a standard deck of 52 cards, one card is drawn. What is the probability the card will be either an ace or a red king?
- (1) $\frac{8}{52}$
 (2) $\frac{3}{14}$
 (3) $\frac{6}{52}$
 (4) $\frac{6}{26}$
- 1881 A newspaper poll was taken to determine the probable winner in an election for mayor. The probability that Andrews will win is 0.4, while the probability that Egan will win is 0.3. What is the probability that either Andrews or Egan will win?
- (1) 0.7 (3) 0.3
 (2) 0.12 (4) 0.4
- 1870 From a standard deck of 52 cards, one card is drawn. What is the probability that it will be either a club or a diamond?
- (1) $\frac{8}{52}$
 (2) $\frac{2}{52}$
 (3) $\frac{26}{52}$
 (4) $\frac{12}{52}$
- 1859 A six-sided fair die is rolled. What is the probability of rolling a 3 or a 6?
- (1) $\frac{2}{6}$
 (2) $\frac{2}{6}$
 (3) $\frac{26}{52}$
 (4) $\frac{12}{52}$
- 1775 From a standard deck of 52 cards, a single card is drawn at random. What is the probability that the card drawn is a king or a three?
- (1) $\frac{4}{52}$
 (2) $\frac{8}{52}$
 (3) $\frac{13}{52}$
 (4) $\frac{26}{52}$
- 1739 A card is drawn from a standard deck of 52 cards. What is the probability that it is a king or an ace?
- (1) $\frac{8}{52}$
 (2) $\frac{8}{52}$

2795 The accompanying table shows the weights, in pounds, for the students in an algebra class.

Using the data, complete the cumulative frequency table below and construct a cumulative frequency histogram on the grid.

Interval	Frequency	Cumulative Frequency
91–100	6	
101–110	3	
111–120	0	
121–130	3	
131–140	0	
141–150	2	
151–160	2	

The table is completed correctly, and an appropriate cumulative frequency histogram is drawn and labeled.

4468 Four hundred licensed drivers participated in the math club's survey on driving habits. The table below shows the number of drivers surveyed in each age group.

Ages of People in Survey on Driving Habits

Age Group	Number of Drivers
16–25	150
26–35	129
36–45	33
46–55	57
56–65	31

Which statement best describes a conclusion based on the data in the table?

- (1) It may be biased because no one younger than 16 was surveyed.
- (2) It would be fair because many different age groups were surveyed.
- (3) It would be fair because the survey was conducted by the math club students.
- (4) **It may be biased because the majority of drivers surveyed were in the younger age intervals.**

4451 Three high school juniors, Reese, Matthew and Chris, are running for student council president. A survey is taken a week before the election asking 40 students which candidate they will vote for in the election. The results are shown in the table below.

Candidate's Name	Number of Students Supporting Candidate
Reese	15
Matthew	13
Chris	12

Based on the table, what is the probability that a student will vote for Reese?

- (1) $\frac{1}{3}$
- (2) $\frac{3}{5}$
- (3) **$\frac{3}{8}$**
- (4) $\frac{5}{8}$

3833 A restaurant sells kids' meals consisting of one main course, one side dish, and one drink, as shown in the table below.

Main Course	Side Dish	Drink
hamburger	French fries	milk
chicken nuggets	applesauce	juice
turkey sandwich		soda

Draw a tree diagram or list the sample space showing all possible kids' meals. How many different kids' meals can a person order?

José does not drink juice. Determine the number of different kids' meals that do *not* include juice.

José's sister will eat *only* chicken nuggets for her main course. Determine the number of different kids' meals that include chicken nuggets.

A correct tree diagram or sample space and 18 total meals, 12 meals without juice, and 6 meals with chicken nuggets.

3737 Samuel is buying a new car. He wants either a convertible or a hatchback. Both types of cars are available in red, white, or blue and with automatic or standard transmission. Draw a tree diagram or list a sample space of all possible choices of cars that are available.

2599 The test scores for 10 students in Ms. Sampson's homeroom were 61, 67, 81, 83, 87, 88, 89, 90, 98, and 100. Which frequency table is accurate for this set of data?

Interval	Frequency
61–70	2
71–80	2
81–90	7
91–100	10

(1)

Interval	Frequency
61–70	2
71–80	2
81–90	8
91–100	10

(2)

Interval	Frequency
61–70	2
71–80	0
81–90	8
91–100	10

(3)

Interval	Frequency
61–70	2
71–80	0
81–90	6
91–100	2

(4)

2596

In Jackson County, Wyoming, license plates are made with two letters (A through Z) followed by three digits (0 through 9). The plates are made according to the following restrictions:

- the first letter must be *J* or *W*, and the second letter can be any of the 26 letters in the alphabet
- no digit can be repeated

How many different license plates can be made with these restrictions?

37,440

4445 How many different sandwiches consisting of one type of cheese, one condiment, and one bread choice can be prepared from five types of cheese, two condiments, and three bread choices?

- (1) 10 (3) 15
(2) 13 (4) **30**

4185 The local ice cream stand offers three flavors of soft-serve ice cream: vanilla, chocolate, and strawberry; two types of cone: sugar and wafer; and three toppings: sprinkles, nuts, and cookie crumbs. If Dawn does not order vanilla ice cream, how many different choices can she make that have one flavor of ice cream, one type of cone, and one topping?

- (1) 7 (3) **12**
(2) 8 (4) 18

2008 Evaluate: $6!$

720

3902 A basketball squad has ten players. Which expression represents the number of five-player teams that can be made if John, the team captain, must be on every team?

- (1) ${}_{10}C_5$ (3) ${}_9P_4$
(2) ${}_9C_4$ (4) ${}_{10}P_5$

3898 How many different two-letter arrangements can be formed using the letters in the word "BROWN"?

- (1) 10 (3) **20**
(2) 12 (4) 25

3772 When the Smith family decided to have their new house built, they found that there were 60 different choices involving location, style, and color. If they had their choice of 2 locations and 5 styles, how many choices of color did they have?

- (1) **6** (3) 50
(2) 12 (4) 53

- 4535 Each of the hats shown below has colored marbles placed inside. Hat *A* contains five green marbles and four red marbles. Hat *B* contains six blue marbles and five red marbles. Hat *C* contains five green marbles and five blue marbles.



Hat A



Hat B



Hat C

If a student were to randomly pick one marble from each of these three hats, determine from which hat the student would most likely pick a green marble. Justify your answer.

Determine the fewest number of marbles, if any, and the color of these marbles that could be added to *each* hat so that the probability of picking a green marble will be one-half in each of the three hats.

Hat A and an appropriate justification is given, and 1 color that is not green in hat A, 11 green in hat B, and none in hat C, and appropriate work is shown.

- 2315 According to tradition, if a groundhog sees its shadow on February 2, it predicts six more weeks of winter for local residents. The table below shows three groundhogs, the number of years each one has been predicting the weather, and the number of right and wrong predictions each has made.

Groundhog	Years Predicting the Weather	Predictions Made
Punxsutawney Phil	15 years	10 right, 5 wrong
Staten Island	7 years	6 right, 1 wrong
Chicago	6 years	1 right, 5 wrong

If these three groundhogs predict the weather for the next 20 years, about how many times would you expect:

a Punxsutawney Phil to be wrong

b Staten Island to be wrong

c Chicago to be right

***a* Punxsutawney Phil was wrong with a ratio of $\frac{5}{15} = \frac{1}{3}$ times.**

$.75 \times 20 = 6.666$ which rounds to 7.

***b* Staten Island was wrong with a ratio of $\frac{1}{7}$ times.**

$\frac{1}{7} \times 20 = 2.857142$ which rounds to 3.

***c* Chicago was wrong with a ratio of $\frac{1}{6}$ times.**

$\frac{1}{6} \times 20 = 3.33$ which rounds to 3.

- 3866 Some books are laid on a desk. Two are English, three are mathematics, one is French, and four are social studies. Theresa selects an English book and Isabelle then selects a social studies book. Both girls take their selections to the library to read. If Truman then selects a book at random, what is the probability that he selects an English book?

$\frac{1}{8}$

- 2763 Five friends met for lunch, and they all shook hands. Each person shook the other person's right hand only once. What was the total number of handshakes?

10

4517 This year, John played in 10 baseball games. In these games he had hit the ball 2, 3, 0, 1, 3, 2, 4, 0, 2, and 3 times. In the first 10 games he plays next year, John wants to increase his average (mean) hits per game by 0.5. What is the total number of hits John needs over the first 10 games next year to achieve his goal?

- (1) 5 (3) 20
(2) 2 (4) 25

4433 Ms. Mosher recorded the math test scores of six students in the table below.

Student	Student Score
Andrew	72
John	80
George	85
Amber	93
Betty	78
Roberto	80

Determine the mean of the student scores, to the *nearest tenth*.

Determine the median of the student scores.

Describe the effect on the mean and the median if Ms. Mosher adds 5 bonus points to each of the six students' scores.

Mean = 81.3, median = 80

3735 The accompanying table represents the number of cell phone minutes used for one week by 23 users.

Number of Minutes	Number of Users
71–80	10
61–70	7
51–60	2
41–50	3
31–40	1

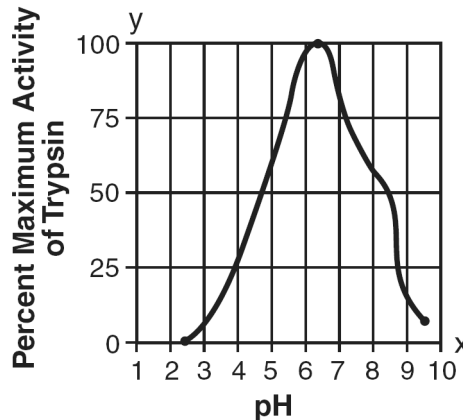
Which interval contains the median?

- (1) 41–50 (3) 61–70
(2) 51–60 (4) 71–80

2729 Melissa's test scores are 75, 83, and 75. Which statement is true about this set of data?

- (1) mean < mode (3) **mode = median**
(2) mode < median (4) mean = median

2826 Data collected during an experiment are shown in the accompanying graph.



What is the range of this set of data?

- (1) $2.5 \leq y \leq 9.5$ (3) $0 \leq y \leq 100$
(2) $2.5 \leq x \leq 9.5$ (4) $1 \leq x \leq 10$

2798 In his first three years coaching baseball at High Ridge High School, Coach Batty's team won 7 games the first year, 16 games the second year, and 4 games the third year. How many games does the team need to win in the fourth year so that the coach's average will be 10 wins per year?

- (1) 13 (3) 3
(2) 10 (4) 9

2766 Sara's test scores in mathematics were 64, 80, 88, 78, 60, 92, 84, 76, 86, 78, 72, and 90. Determine the mean, the median, and the mode of Sara's test scores.

Mean = 79
Median = 79
Mode = 78

2673 The weights of all the students in grade 9 are arranged from least to greatest. Which statistical measure separates the top half of this set of data from the bottom half?

- (1) mean (3) **median**
(2) mode (4) average

2622 On the first six tests in her social studies course, Jerelyn's scores were 92, 78, 86, 92, 95, and 91. Determine the median and the mode of her scores. If Jerelyn took a seventh test and raised the mean of her scores *exactly* 1 point, what was her score on the seventh test?

Median = 91.5, mode = 92, and seventh test score = 96, and appropriate work is shown.

2459 The ages of five children in a family are 3, 3, 5, 8, and 18. Which statement is true for this group of data?

- (1) mode > mean (3) median = mode
(2) **mean > median** (4) median > mean

2190 If the mean of the numbers 9, 10, 11, 12, and x is 13, what is the value of x ?

23

A. Addition, Subtraction, & Scalar Multiplication

$$2708 \quad J = \begin{bmatrix} -2 & 1 \\ 0 & 5 \end{bmatrix}$$

$$K = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$$

Which matrix correctly shows $2J + 3K$?

(1) $\begin{bmatrix} -4 & 1 \\ 0 & 19 \end{bmatrix}$

(3) $\begin{bmatrix} 1 & 1 \\ 0 & -16 \end{bmatrix}$

(2) $\begin{bmatrix} -1 & -1 \\ 0 & 16 \end{bmatrix}$

(4) $\begin{bmatrix} -1 & -1 \\ 5 & 16 \end{bmatrix}$

$$2707 \quad [A] = \begin{bmatrix} -4 & 6 & 2 \\ 8 & -2 & 0 \end{bmatrix}$$

$$[B] = \begin{bmatrix} 1 & 2 & -1 \\ 10 & 0 & -2 \end{bmatrix}$$

Which matrix correctly shows $[B] - [A]$?

(1) $\begin{bmatrix} -3 & 8 & 1 \\ 18 & -2 & -2 \end{bmatrix}$

(3) $\begin{bmatrix} 5 & -4 & -3 \\ 0 & -2 & 2 \end{bmatrix}$

(2) $\begin{bmatrix} -5 & 4 & 3 \\ 0 & -2 & 2 \end{bmatrix}$

(4) $\begin{bmatrix} 5 & -4 & -3 \\ 0 & 2 & -2 \end{bmatrix}$

$$2704 \quad A = \begin{bmatrix} 3 & 2 & 5 \\ -1 & -1 & 6 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & -1 & 0 \\ -4 & 9 & 4 \end{bmatrix}$$

Which matrix correctly shows $B + A$?

(1) $\begin{bmatrix} 4 & 8 & 10 \\ -5 & 1 & 5 \end{bmatrix}$

(3) $\begin{bmatrix} 4 & 1 & 5 \\ -5 & 8 & 10 \end{bmatrix}$

(2) $\begin{bmatrix} -4 & -1 & 5 \\ 1 & 8 & -10 \end{bmatrix}$

(4) $B + A$ is undefined.

$$2706 \quad A = \begin{bmatrix} 2 & 1 & 0 \\ -1 & 0 & 9 \\ 4 & 2 & -3 \end{bmatrix}$$

$$B = \begin{bmatrix} 4 & 2 \\ 0 & -1 \\ 0 & -8 \end{bmatrix}$$

Which matrix correctly shows $A + B$?

(1) $\begin{bmatrix} 6 & 3 & 0 \\ -1 & -1 & 9 \\ 4 & -6 & -3 \end{bmatrix}$

(3) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(2) $\begin{bmatrix} 6 & 3 \\ -1 & -1 \\ 4 & -6 \end{bmatrix}$

(4) $A + B$ is undefined.

2705 Matrix A shows the average heights of adult elephants and giraffes in feet. Matrix B shows the heights of elephants and giraffes at birth in feet.

$$\begin{array}{cc} \textit{Elephants} & \textit{Giraffe} \\ \textit{Males} & \begin{bmatrix} 9 & 13 \\ 7.5 & 11 \end{bmatrix} \\ \textit{Females} & \end{array} = A$$

$$\begin{array}{cc} \textit{Elephants} & \textit{Giraffe} \\ \textit{Males} & \begin{bmatrix} 6 & 3 \\ 6 & 3 \end{bmatrix} \\ \textit{Females} & \end{array} = B$$

Which matrix represents the growth height of elephants and giraffes, $A - B$?

(1) $\begin{bmatrix} 3 & 10 \\ 1.5 & 8 \end{bmatrix}$

(3) $\begin{bmatrix} -3 & -10 \\ -1.5 & -8 \end{bmatrix}$

(2) $\begin{bmatrix} 15 & 26 \\ 13.5 & 14 \end{bmatrix}$

(4) $\begin{bmatrix} 2 & 10 \\ 1 & 8 \end{bmatrix}$

VIII. LOGIC

A. Logical Equivalence

- 4149 Which statement is logically equivalent to "If the traffic light is red, then the cars stop"?
- (1) If the traffic light is not red, then the cars do not stop.
 - (2) If the cars stop, then the traffic light is red.
 - (3) **If the cars do not stop, then the traffic light is not red.**
 - (4) If the traffic light is not red, then the cars stop.
- 4148 Which statement is logically equivalent to $\sim(\sim a \vee b)$?
- (1) $a \vee \sim b$
 - (2) $a \wedge b$
 - (3) **$a \wedge \sim b$**
 - (4) $a \vee b$
- 4146 Which statement is logically equivalent to $\sim(p \vee \sim r)$?
- (1) $p \wedge \sim r$
 - (2) $\sim p \vee r$
 - (3) **$\sim p \wedge r$**
 - (4) $\sim p \vee \sim r$
- 4141 Which statement is logically equivalent to $\sim(p \wedge \sim q)$?
- (1) $\sim p \wedge q$
 - (2) **$\sim p \vee q$**
 - (3) $\sim p \wedge \sim q$
 - (4) $\sim p \vee \sim q$
- 4115 Which statement is logically equivalent to $\sim a \rightarrow b$?
- (1) $a \rightarrow \sim b$
 - (2) $b \rightarrow \sim a$
 - (3) **$\sim b \rightarrow a$**
 - (4) $\sim b \rightarrow \sim a$
- 4108 Which statement is equivalent to "If a quadrilateral is a rectangle, the diagonals are congruent"?
- (1) **If the diagonals of a quadrilateral are congruent, the quadrilateral is a rectangle.**
 - (2) If a quadrilateral is not a rectangle, the diagonals of the quadrilateral are not congruent.
 - (3) If the diagonals of a quadrilateral are not congruent, the quadrilateral is not a rectangle.
 - (4) If a quadrilateral is a parallelogram, the diagonals are congruent.
- 4095 Which statement is logically equivalent to the statement: "If you are not part of the solution, then you are part of the problem"?
- (1) If you are part of the solution, then you are not part of the problem.
 - (2) **If you are not part of the problem, then you are part of the solution.**
 - (3) If you are part of the problem, then you are not part of the solution.
 - (4) If you are not part of the problem, then you are not part of the solution.
- 4086 The statement $\sim p \vee q$ is equivalent to
- (1) **$\sim(p \wedge \sim q)$**
 - (2) $\sim(p \vee \sim q)$
 - (3) $\sim(p \vee q)$
 - (4) $\sim(p \wedge q)$
- 4083 Which statement is logically equivalent to $\sim p \rightarrow q$?
- (1) $p \rightarrow \sim q$
 - (2) $q \rightarrow \sim p$
 - (3) **$\sim q \rightarrow p$**
 - (4) $q \rightarrow p$

1. Logical Operations i. Original & Contrapositive

- 4087 Which statement is logically equivalent to the statement, "If we recycle, then the amount of trash in landfills is reduced"?
- (1) If we do not recycle, then the amount of trash in landfills is not reduced.
 - (2) **If the amount of trash in landfills is not reduced, then we did not recycle.**
 - (3) If the amount of trash in landfills is reduced, then we recycled.
 - (4) If we do not recycle, then the amount of trash in landfills is reduced.
- 4080 Which statement below expresses a conclusion that logically follows from "All members of Arista are honor students"?
- (1) If Juan is an honor student, he is a member of Arista.
 - (2) **If Marty is not an honor student, he is not a member of Arista.**
 - (3) If Lynette is not a member of Arista, she is not an honor student.
 - (4) If Dawn is not an honor student, she is a member of Arista.
- 4077 Given the true statements: $p \vee q$
 p
- Which conclusion must follow?
- (1) q
 - (2) $\sim q$
 - (3) $\sim p$
 - (4) **No valid conclusion is possible.**
- 4076 Given:
If the weather is sunny, John goes fishing.
John does not go fishing.
- Write a logical conclusion.
Answers will vary.
- 4074 Which is the negation of "It rains or it shines"?
- (1) It rains and it shines.
 - (2) It rains or it does not shine.
 - (3) It does not rain or it does not shine.
 - (4) **It does not rain and it does not shine.**
- 4073 Given: $p \rightarrow q$
 $\sim q$
- Which is a logical conclusion?
- (1) p
 - (2) **$\sim p$**
 - (3) q
 - (4) $\sim p \wedge q$
- 4071 Statement a is false and statement b is true. Which statement is also true?
- (1) $a \vee \sim b$
 - (2) **$\sim a \wedge b$**
 - (3) $\sim a \rightarrow \sim b$
 - (4) $a \leftrightarrow b$
- 4061 Which is logically equivalent to $\sim(p \vee \sim q)$?
- (1) $\sim p \vee \sim q$
 - (2) $\sim p \wedge \sim q$
 - (3) **$\sim p \wedge q$**
 - (4) $p \wedge q$

VIII. LOGIC

2. Logic Proofs (Extended task)

A. Using Truth Tables

i. Truth Tables & Tautologies

- 2180 Let p represent "I am happy."
 Let q represent "I am wearing green."
 a) Write each of the sentences below in symbolic form.
 (1) If I am happy, then I am not wearing green.
 (2) If I am wearing green, then I am happy.
 b) Construct a truth table to determine whether or not sentences (1) and (2) in part a are logically equivalent. Justify your answer.

- a) (1) $p \rightarrow \sim q$
 (2) $q \rightarrow p$

- 2150 Let p represent "I go to the beach."
 Let q represent "I get a sunburn."
 a Using p and q , write these statements in symbolic form:
 (1) It is not the case that I went to the beach and I got a sunburn.
 (2) I did not go to the beach or I did not get a sunburn.
 b Construct a truth table or construct two truth tables to determine if statements (1) and (2), written in part a, are logically equivalent. Justify your answer.

- a (1) $\sim(p \wedge q)$
 (2) $\sim p \vee \sim q$

- 207 a On your answer sheet, copy and complete the truth table for the statement
 $\sim(p \rightarrow q) \leftrightarrow (\sim p \vee q)$.

p	q	$p \rightarrow q$	$\sim(p \rightarrow q)$	$\sim p$	$\sim p \vee q$	$\sim(p \rightarrow q) \leftrightarrow (\sim p \vee q)$
T	T					
T	F					
F	T					
F	F					

- b Based on the truth table completed in part a, is
 $\sim(p \rightarrow q) \leftrightarrow (\sim p \vee q)$ a tautology?
 c Justify the answer given in part b.

b No

- 177 a Construct and complete the truth table for the statement $(p \wedge q) \rightarrow (\sim p \vee \sim q)$.
 b Based on the truth table constructed in part a, which truth values of p and q make $(p \wedge q) \rightarrow (\sim p \vee \sim q)$ false?

b p and q are both true.

- 150 a Construct and complete the truth table for the statement $(\sim p \rightarrow q) \leftrightarrow (p \vee q)$.
 b Based on the truth table constructed in part a, is $(\sim p \rightarrow q) \leftrightarrow (p \vee q)$ a tautology?

b yes

- 85 On your answer paper, construct a truth table for the statement $\sim(p \rightarrow \sim q) \leftrightarrow (p \wedge q)$.

- 104 In the accompanying truth table, which statement should be the heading for column 4?

Column 1	Column 2	Column 3	Column 4
p	q	$\sim q$?
T	T	F	F
T	F	T	T
F	T	F	F
F	F	T	F

- (1) $p \wedge \sim q$ (3) $p \rightarrow \sim q$
 (2) $p \vee \sim q$ (4) $\sim q \rightarrow p$

- 77 a On your answer paper, construct a truth table for the statement $\sim(p \vee q) \rightarrow (\sim p \wedge \sim q)$.
 b Using your results from part a, is $\sim(p \vee q) \rightarrow (\sim p \wedge \sim q)$ a tautology?
 b yes

- 65 a Construct a truth table for the statement
 $(p \rightarrow q) \leftrightarrow (\sim p \vee q)$
 b Is $(p \rightarrow q) \leftrightarrow (\sim p \vee q)$ a tautology?
 c Justify the answer you gave in part b.
 b yes

- 57 Answer both a and b.
 a Given the inequality:

$$8x \geq 3(x - 5)$$

(1) Solve for x .

(2) Choose one value of x from your solution in part (1), and show that it makes the inequality $8x \geq 3(x - 5)$ true.

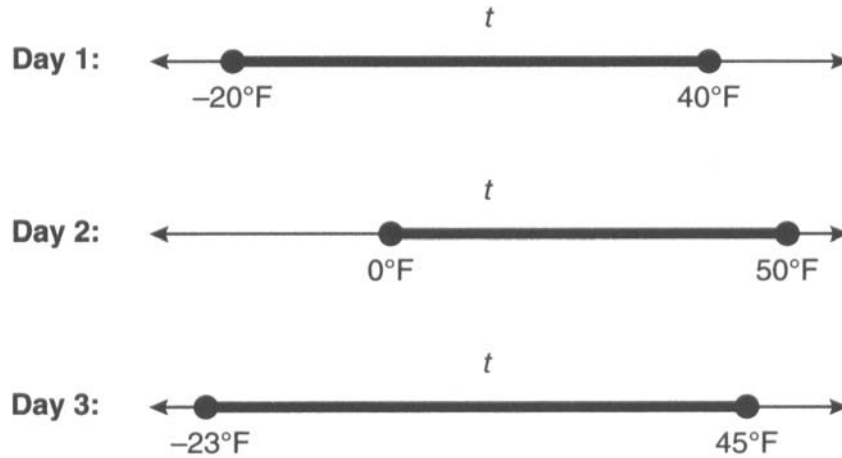
- b On your answer paper, copy and complete the truth table for the statement $(p \rightarrow q) \leftrightarrow (p \vee q)$

p	q	$p \rightarrow q$	$p \vee q$	$(p \rightarrow q) \leftrightarrow (p \vee q)$
T	T			
T	F			
F	T			
F	F			

a (1) $x \geq -3$

- 46 a Construct a truth table for the statement
 $[(p \rightarrow q) \wedge p] \rightarrow q$.
 b Is this statement a tautology?
 b yes

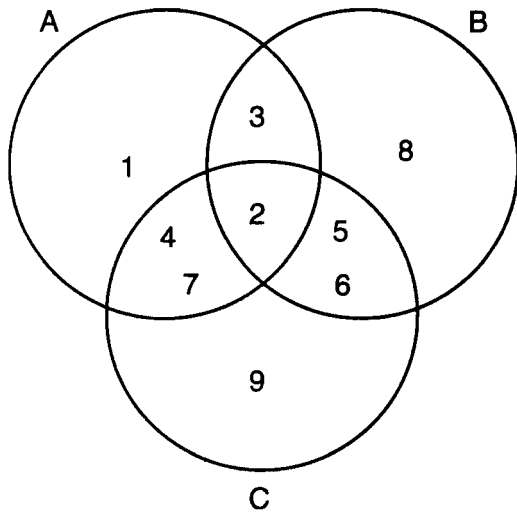
2869 Maureen tracks the range of outdoor temperatures over three days. She records the following information.



Express the intersection of the three sets as an inequality in terms of temperature, t .

$0 \leq t \leq 40$

4500 Which set represents the intersection of sets A , B , and C shown in the diagram below?



- (1) {3, 4, 5, 6, 7}
- (2) {2}
- (3) {2, 3, 4, 5, 6, 7}
- (4) {1, 2, 3, 4, 5, 6, 7, 8, 9}

4393 Given:

- $Q = \{0, 2, 4, 6\}$
- $W = \{0, 1, 2, 3\}$
- $Z = \{1, 2, 3, 4\}$

What is the intersection of sets Q , W , and Z ?

- (1) {2}
- (2) {0, 2}
- (3) {1, 2, 3}
- (4) {0, 1, 2, 3, 4, 6}

3886 The expression $(-2a^2b^3)(4ab^5)(6a^3b^2)$ is equivalent to

- (1) $8a^6b^{30}$
- (2) $48a^5b^{10}$
- (3) $-48a^6b^{10}$
- (4) $-48a^5b^{10}$

3709 At an all-county music competition, 150 students participated. If 90 students sang in the chorus and 90 played in the band, how many students *both* sang in the chorus and played in the band?

- (1) 0
- (2) 30
- (3) 60
- (4) 240

3682 A school newspaper took a survey of 100 students. The results of the survey showed that 43 students are fans of the Buffalo Bills, 27 students are fans of the New York Jets, and 48 students do not like either team. How many of the students surveyed are fans of *both* the Buffalo Bills and the New York Jets?

- (1) 16
- (2) 18
- (3) 52
- (4) 70

2822 José surveyed 20 of his friends to find out what equipment they use to play recorded movies. He found that 12 of his friends have only DVD players, 5 have both DVD players and VCRs, and 2 have neither type of player. The rest of his friends have only VCRs. What is the total number of his friends that have VCRs?

6

2692 There are 30 students on a school bus. Of these students, 24 either play in the school band or sing in the chorus. Six of the students play in the school band but do not sing in the chorus. Fourteen of the students sing in the chorus and also play in the school band. How many students on the school bus sing in the chorus but do *not* play in the band?

4

2669 In a survey of 400 teenage shoppers at a large mall, 240 said they shopped at Abernathy's, 210 said they shopped at Bongo Republic, and 90 said they shopped at both stores. How many of the teenage shoppers surveyed did not shop at either store?

40

VIII. LOGIC**A. Real World Applications**

4180 Chris is shopping for apples. Green apples cost \$.25 and red apples cost \$.30. If he spend \$5.55 total and \$2.25 on green apples, how many total apples did he buy?

- (1) 9 (3) **20**
 (2) 11 (4) 22

4179 Juan got a 95 on his last English test which consisted of 20 questions worth 2 points each and 20 questions worth 3 points each. How many possible ways could Juan have scored his 95?

- (1) 0 (3) 2
 (2) **1** (4) 4

4178 Jenny scored 17 points in a basketball game. She attempted 8 field goals and 3 free throws. Each successful field goal is 2 points and each successful free throw is 1 point. If she made all of her free throws, how many field goals did she miss?

- (1) **1** (3) 3
 (2) 2 (4) 4

4177 Tom scored 23 points in a basketball game. He attempted 15 field goals and 6 free throws. If each successful field goal is 2 points and each successful free throw is 1 point, is it possible he successfully made all 6 of his free throws? Justify your answer.

No, and a correct justification.

4176 The statement " x is *not* the square of an integer and x is a multiple of 3" is true when x is equal to

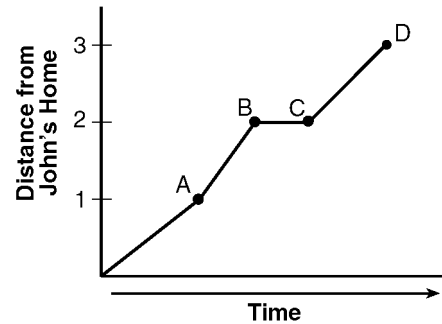
- (1) 9 (3) 32
 (2) **18** (4) 36

4175 Parking charges at Superior Parking Garage are \$5.00 for the first hour and \$1.50 for each additional 30 minutes. If Margo has \$12.50, what is the maximum amount of time she will be able to park her car at the garage?

- (1) $2\frac{1}{2}$ (3) 6
 (2) **$3\frac{1}{2}$** (4) $6\frac{1}{2}$

4. Applied Logic Questions**i. Other Applied Logic Questions**

4174 John left his home and walked 3 blocks to his school, as shown in the accompanying graph.



What is one possible interpretation of the section of the graph from point B to point C?

- (1) John arrived at school and stayed throughout the day.
 (2) **John waited before crossing a busy street.**
 (3) John returned home to get his mathematics homework.
 (4) John reached the top of a hill and began walking on level ground.

3682 A school newspaper took a survey of 100 students. The results of the survey showed that 43 students are fans of the Buffalo Bills, 27 students are fans of the New York Jets, and 48 students do not like either team. How many of the students surveyed are fans of *both* the Buffalo Bills and the New York Jets?

- (1) 16 (3) 52
 (2) **18** (4) 70

2114 In a hockey league, 87 players play on seven different teams. Each team has at least 12 players. What is the largest possible number of players on any one team?

- (1) 13 (3) **15**
 (2) 14 (4) 21

244 In a class of 50 students, 18 take music, 26 take art, and 2 take both art and music. How many students in the class are not enrolled in either music or art?

- (1) 6 (3) 16
 (2) **8** (4) 24