

Integer

Which of the following is an integer?

$$-\frac{7}{2}, -.1, 12\%, 3, \pi$$

SAT Mathcards

Arithmetic

An **integer** is a multiple of 1. Integers include negative whole numbers and zero.

KAPLAN

3

Consecutive numbers

What is the next number in the following sequence?

$$39, 42, 45, 48, \dots$$

SAT Mathcards

Arithmetic

Consecutive numbers are numbers of a certain type, presented in order without skipping any. The numbers 39, 42, 45, and 48 are consecutive multiples of 3. Each number in the sequence is 3 more than the previous number. The next number would be $48 + 3 = 51$.

KAPLAN

51

PEMDAS

$$9 - 2 \times (5 - 3)^2 + 6 \div 3 = ?$$

SAT Mathcards

Arithmetic

When performing multiple operations, remember **PEMDAS**, which means **Parentheses** first, then **Exponents**, then **Multiplication/Division** (left to right), and lastly **Addition/Subtraction** (left to right). In the expression $9 - 2 \times (5 - 3)^2 + 6 \div 3$, begin with the parentheses: $(5 - 3) = 2$. Then do the exponent: $2^2 = 4$. Now the expression is: $9 - 2 \times 4 + 6 \div 3$. Next do the multiplication and division to get: $9 - 8 + 2$, which equals 3.

KAPLAN

3

Factors

List all the factors of 18.

SAT Mathcards

Arithmetic

The **factors** of integer n are the positive integers that divide into n with no remainder. The **multiples** of n are the integers that n divides into with no remainder. 3 is a multiple of 6, and 6 is a multiple of 18. All the factors of 18 are listed below.

KAPLAN

1, 2, 3, 6,
9, and 18

Fold Here

Digit

How many distinct digits are in the number 321,321,000 ?

SAT Mathcards

Arithmetic

Digits are the integers 0 through 9. Integers greater than 9 have more than one digit. The number 321,321,000 has 9 digits, but only 4 **distinct** (different) digits: 3, 2, 1, and 0.

KAPLAN

4

Counting consecutive integers

How many integers are there from 13 through 31, inclusive?

SAT Mathcards

Arithmetic

To **count consecutive integers**, subtract the smallest from the largest and add 1. To count the integers from 13 through 31, subtract: $31 - 13 = 18$. Then add 1: $18 + 1 = 19$.

KAPLAN

19

Sum, difference, product

What is the positive difference between the sum of 4 and 5 and the product of 4 and 5 ?

SAT Mathcards

Arithmetic

The **sum** is the result of addition. The **difference** is the result of subtraction. The **product** is the result of multiplication. The sum of 4 and 5 is 9. The product of 4 and 5 is 20. The positive difference between 9 and 20 is 11.

KAPLAN

11

Remainders

What is the remainder when 487 is divided by 5 ?

SAT Mathcards

Arithmetic

The **remainder** is the number left over after division. 487 is 2 more than 485, which is a multiple of 5, so when 487 is divided by 5, the remainder will be 2.

KAPLAN

2

Fold Here

Least common multiple

What is the least common multiple of 12 and 15 ?

SAT Mathcards

Arithmetic

To find the **least common multiple**, check out the multiples of the larger number until you find one that's also a multiple of the smaller. Taking the multiples of 15: 15 is not divisible by 12; 30's not; nor is 45. But the next multiple of 15, 60, is divisible by 12, so it's the LCM.

KAPLAN

60

Prime numbers

What is the greatest prime number less than 37 ?

SAT Mathcards

Arithmetic

A **prime number** is a positive integer that is divisible only by 1 and itself. The smallest prime number, and the only even prime number, is 2.

KAPLAN

31

Multiples of 2 and 4

Which of the following is a multiple of 2 but not a multiple of 4 ?

124, 352, 483, 562, 708, 984

SAT Mathcards

Arithmetic

An integer is **divisible by 2** (even) if the last digit is even. An integer is **divisible by 4** if the last two digits make a multiple of 4. The last digit of 562 is 2, which is even, so 562 is a multiple of 2. The last two digits make 62, which is not divisible by 4, so 562 is not divisible by 4.

KAPLAN

562

Multiplying fractions

$$\frac{5}{7} \cdot \frac{3}{4} = ?$$

SAT Mathcards

Arithmetic

To **multiply fractions**, multiply the numerators and multiply the denominators.

$$\frac{5}{7} \cdot \frac{3}{4} = \frac{5 \cdot 3}{7 \cdot 4} = \frac{15}{28}$$

KAPLAN

$\frac{15}{28}$

Fold Here

Greatest common factor

What is the greatest common factor of 36 and 48 ?

SAT Mathcards

Arithmetic

To find the **greatest common factor**, break down both numbers into their prime factorizations and take all the prime factors they have in common. $36 = 2 \times 2 \times 3 \times 3$, and $48 = 2 \times 2 \times 2 \times 2 \times 3$. What they have in common is two 2's and one 3, so the GCF is $2 \times 2 \times 3 = 12$.

KAPLAN

12

Multiples of 3 and 9

Which of the following is a multiple of 3 but not a multiple of 9 ?

109, 117, 260, 361, 459, 957, 1001

SAT Mathcards

Arithmetic

An integer is **divisible by 3** if the sum of its digits is divisible by 3. An integer is **divisible by 9** if the sum of its digits is divisible by 9. The sum of the digits in 957 is 21, which is divisible by 3 but not by 9, so 957 is divisible by 3 but not by 9.

Fold Here

KAPLAN

957

Adding and subtracting fractions

$$\frac{2}{15} + \frac{3}{10} = ?$$

SAT Mathcards

Arithmetic

To **add or subtract fractions**, first find a common denominator, then add or subtract the numerators.

$$\frac{2}{15} + \frac{3}{10} = \frac{4}{30} + \frac{9}{30} = \frac{4+9}{30} = \frac{13}{30}$$

KAPLAN

$\frac{13}{30}$

Dividing fractions

$$\frac{1}{2} \div \frac{3}{5} ?$$

SAT Mathcards

Arithmetic

To **divide fractions**, invert the second one and multiply.

$$\frac{1}{2} \div \frac{3}{5} = \frac{1}{2} \cdot \frac{5}{3} = \frac{1 \cdot 5}{2 \cdot 3} = \frac{5}{6}$$

KAPLAN

$\frac{5}{6}$

Reciprocal

What is the reciprocal of $\frac{3}{7}$?

SAT Mathcards

Arithmetic

To find the **reciprocal** of a fraction, switch the numerator and the denominator. The reciprocal of $\frac{3}{7}$ is $\frac{7}{3}$. The reciprocal of 5 is $\frac{1}{5}$. The product of reciprocals is 1.

KAPLAN

$\frac{7}{3}$

Mixed numbers and improper fractions

Express $7\frac{1}{3}$ as an improper fraction.

SAT Mathcards

Arithmetic

To **convert a mixed number to an improper fraction**, multiply the whole number part by the denominator, then add the numerator. The result is the new numerator (over the same denominator). To convert $7\frac{1}{3}$, first multiply 7 by 3, then add 1, to get the new numerator of 22. Put that over the same denominator, 3, to get $\frac{22}{3}$.

Fold Here

KAPLAN

$\frac{22}{3}$

Percent

Express 32% as a fraction in lowest terms.

SAT Mathcards

Arithmetic

A **percent** is a fraction with an implied denominator of 100. 32% means $\frac{32}{100}$ which reduces to $\frac{8}{25}$.

KAPLAN

$\frac{8}{25}$

Converting tenths

Express $\frac{3}{10}$ as a percent.

SAT Mathcards

Arithmetic

When converting, remember that $\frac{1}{10} = .1 = 10\%$. $\frac{3}{10}$ is 3 times that, so it equals 30%.

KAPLAN

30%

Comparing fractions

Which is greater: $\frac{3}{4}$ or $\frac{5}{7}$?

SAT Mathcards

Arithmetic

One way to **compare fractions** is to re-express them with a common denominator. $\frac{3}{4} = \frac{21}{28}$ and $\frac{5}{7} = \frac{20}{28}$. $\frac{21}{28}$ is greater than $\frac{20}{28}$, so $\frac{3}{4}$ is greater than $\frac{5}{7}$. Another way to **compare fractions** is to convert them both to decimals. (Use your calculator.) $\frac{3}{4}$ converts to .75, and $\frac{5}{7}$ converts to approximately .714.

KAPLAN

$\frac{3}{4}$

Converting fractions to decimals

Express $\frac{5}{8}$ as a decimal.

SAT Mathcards

Arithmetic

To **convert a fraction to a decimal**, divide the bottom into the top. (Use your calculator.) To convert $\frac{5}{8}$, divide 8 into 5, yielding .625 .

KAPLAN

.625

Percent increase

What number is 25% more than 40 ?

SAT Mathcards

Arithmetic

To **increase a number by a percent**, add the percent to 100%, convert to a decimal, and multiply. To increase 40 by 25%, add 25% to 100%, convert 125% to 1.25, and multiply by 40. $1.25 \times 40 = 50$.

KAPLAN

50

Converting fifths

Express $\frac{2}{5}$ as a decimal.

SAT Mathcards

Arithmetic

When converting, remember that $\frac{1}{5} = .2 = 20\%$. $\frac{2}{5}$ is twice that much, so it equals .4.

KAPLAN

.4

Fold Here

Converting fourths

Express 75% as a fraction in lowest terms.

SAT Mathcards

Arithmetic

When converting, remember that $\frac{1}{4} = .25 = 25\%$. 75% is 3 times that, so it equals $\frac{3}{4}$.

KAPLAN

$\frac{3}{4}$

Converting eighths

Express $37\frac{1}{2}\%$ as a fraction in lowest terms.

SAT Mathcards

Arithmetic

When converting, remember that $\frac{1}{8} = .125 = 12\frac{1}{2}\%$. $37\frac{1}{2}\%$ is 3 times that, so it equals $\frac{3}{8}$.

KAPLAN

$\frac{3}{8}$

Using the average to find the sum

The average of 10 numbers is 50.
What is the sum of the 10 numbers?

SAT Mathcards

Arithmetic

Sum = (Average) x (Number of terms). If the average of 10 numbers is 50, then they add up to 10×50 , or 500.

KAPLAN

500

Average of consecutive numbers

What is the average of all the integers from 13 through 77, inclusive?

SAT Mathcards

Arithmetic

To find the **average of evenly spaced numbers**, just average the smallest and the largest. The average of all the integers from 13 through 77 is the same as the average of

13 and 77. $\frac{13 + 77}{2} = \frac{90}{2} = 45$.

KAPLAN

45

Fold Here

Converting thirds

Express $\frac{2}{3}$ as a percent.

SAT Mathcards

Arithmetic

When converting, remember that $\frac{1}{3} = .333... = 33\frac{1}{3}\%$. $\frac{2}{3}$ is twice that, so it equals $66\frac{2}{3}\%$.

KAPLAN

66 $\frac{2}{3}$ %

Average

What is the average (arithmetic mean) of 12, 15, 23, 40, and 40 ?

SAT Mathcards

Arithmetic

To find the **average** of a set of numbers, add them up and divide by the number of numbers.

$$\text{Average} = \frac{\text{Sum of the terms}}{\text{Number of terms}}$$

To find the average of the 5 numbers 12, 15, 23, 40, and 40, first add them up: $12 + 15 + 23 + 40 + 40 = 130$. Then divide the sum by 5: $130 \div 5 = 26$.

KAPLAN

26

Using the average to find the missing number

The average of 4 numbers is 7. If 3 of the numbers are 3, 5, and 8, what is the fourth number?

SAT Mathcards

Arithmetic

To find a **missing number** when you're given the average, use the sum. If the average of 4 numbers is 7, then the sum of those 4 numbers is 4×7 , or 28. Three of the numbers (3, 5, and 8) add up to 16 of that 28, which leaves 12 for the fourth number.

KAPLAN

12

Median

What is the median of 12, 15, 23, 40, and 40 ?

SAT Mathcards

Arithmetic

The **median** is the middle value. The median of 12, 15, 23, 40, and 40 is 23 because it's the middle value: two numbers are smaller and two numbers are bigger. If there's an even number of values, the median is halfway between the two middle values. The median of 12, 15, 23, and 40 is 19 because it's halfway between the two middle values 15 and 23.

KAPLAN

23

Fold Here

Mode

What is the mode of 12, 15, 23, 40, and 40 ?

SAT Mathcards

Arithmetic

The **mode** is the number that appears the most often. The mode of 12, 15, 23, 40, and 40 is 40 because it appears more often than any other number. If two numbers appear equally often, they are both modes.

KAPLAN

40

Using a ratio to find a number

In a group of 18 people, the ratio of men to women is 1:2. How many women are there?

SAT Mathcards

Arithmetic

If the parts add up to the whole, a part-to-part ratio can be turned into 2 part-to-whole ratios by putting each number in the original ratio over the sum of the numbers. If the ratio of men to women is 1 to 2, then the men-to-people ratio is

$$\frac{1}{1+2} = \frac{1}{3} \text{ and the women-to-people ratio is } \frac{2}{1+2} = \frac{2}{3}.$$

In other words, $\frac{2}{3}$ of the 18 people are women.

Fold Here

KAPLAN

12

Average Rate

Alex drove 120 miles at 40 miles per hour and another 120 miles at 60 miles per hour. What was Alex's average speed for the whole 240 miles?

SAT Mathcards

Arithmetic

Average A per $B = \frac{\text{Total } A}{\text{Total } B}$. Average speed = $\frac{\text{Total distance}}{\text{Total time}}$. To

find the average speed for 120 miles at 40 mph and 120 miles at 60 mph, don't just average the two speeds. First figure out the total distance and the total time. The total distance is $120 + 120 = 240$ miles. The times are 3 hours for the first leg and 2 hours for the second leg, or 5 hours total.

The average speed, then, is $\frac{240}{5} = 48$ miles per hour.

KAPLAN

48 mph

Exponents

$$7^3 = ?$$

SAT Mathcards

Algebra

$$7^3 = 7 \cdot 7 \cdot 7 = 343$$

KAPLAN

343

Ratio

A basket contains 12 apples and 20 oranges.
What is the ratio of oranges to apples?

SAT Mathcards

Arithmetic

To find a **ratio**, put the number associated with the word “of” on top and the quantity associated with the word “to” on the bottom and reduce. The ratio of 20 oranges to 12 apples is $\frac{20}{12}$, which reduces to $\frac{5}{3}$.

KAPLAN

$\frac{5}{3}$

Distance, Rate, and Time

How many hours are needed to travel
220 miles at 55 miles per hour?

SAT Mathcards

Fold Here

Arithmetic

Distance = Rate \times Time.
220 miles = (55 miles per hour)(x hours)
220 = 55x
 $x = \frac{220}{55} = 4$

KAPLAN

4

Probability

A box contains 2 white balls, 6 red balls, and 8 green balls. If a ball is chosen at random, what is the probability that the ball is green?

SAT Mathcards

Arithmetic

Probability = $\frac{\text{\# of desired outcomes}}{\text{total \# of possible outcomes}}$.

If 8 of 16 balls are green, the probability of choosing a green ball is $\frac{8}{16}$ or $\frac{1}{2}$.

KAPLAN

$\frac{1}{2}$

Multiplying and dividing powers

$$x^3 \cdot x^4 = ?$$

SAT Mathcards

Algebra

To **multiply powers**, add the exponents:
 $x^3 \cdot x^4 = x^{(3+4)} = x^7$.

To **divide powers**, subtract the exponents:
 $y^{13} \div y^8 = y^{(13-8)} = y^5$.

KAPLAN

x^7

Powers of fractions

Which is larger: $\frac{2}{3}$ or $\left(\frac{2}{3}\right)^2$?

SAT Mathcards

Algebra

Raising a fraction between 0 and 1 to a power yields a number smaller than the original. $\left(\frac{2}{3}\right)^2 = \frac{4}{9}$.

KAPLAN

$$\frac{2}{3}$$

Raising a power to a power

$$(x^3)^4 = ?$$

SAT Mathcards

Algebra

To raise a power to a power, multiply the exponents. $(x^3)^4 = x^{(3 \cdot 4)} = x^{12}$.

Fold Here

KAPLAN

$$x^{12}$$

Multiplying and dividing radicals

$$\frac{\sqrt{6}}{\sqrt{3}} = ?$$

SAT Mathcards

Algebra

The product of square roots is equal to the square root of the product: $\sqrt{3} \times \sqrt{5} = \sqrt{3 \times 5} = \sqrt{15}$. The quotient of square roots is equal to the square root of the quotient:

$$\frac{\sqrt{6}}{\sqrt{3}} = \sqrt{\frac{6}{3}} = \sqrt{2}$$

KAPLAN

$$\sqrt{2}$$

Combining like terms

$$2a + 3a = ?$$

SAT Mathcards

Algebra

To combine like terms, keep the variable part unchanged while adding or subtracting the coefficients. $2a + 3a = (2 + 3)a = 5a$.

KAPLAN

$$5a$$

Powers of negatives

$$(-1)^{57} = ?$$

SAT Mathcards

Algebra

A **negative number raised to an even power** yields a positive result. A **negative number raised to an odd power** yields a negative result. -1 to an even power is 1 ; -1 to an odd power is -1 .

KAPLAN

-1

Radicals

$$\sqrt{16} = ?$$

SAT Mathcards

Fold Here

Algebra

\sqrt{n} is defined as the non-negative number which squared equals n . There are two numbers when squared equal 16 : 4 and -4 . By definition, however, $\sqrt{16}$ means the non-negative square root: 4 .

KAPLAN

4

Square roots of fractions

$$\sqrt{\frac{4}{9}} = ?$$

SAT Mathcards

Algebra

To take the **square root of a fraction**, take the square roots of the numerator and denominator separately.

$$\sqrt{\frac{4}{9}} = \frac{\sqrt{4}}{\sqrt{9}} = \frac{2}{3}$$

KAPLAN

$\frac{2}{3}$

Adding and subtracting polynomials

$$(3x^2 + 5x + 7) - (x^2 + 12) = ?$$

SAT Mathcards

Algebra

To **add or subtract polynomials**, combine like terms.
 $(3x^2 + 5x + 7) - (x^2 + 12) = (3x^2 - x^2) + 5x + (7 - 12) = 2x^2 + 5x - 5$.

KAPLAN

$2x^2 + 5x - 5$

Multiplying monomials

$$2a \cdot 3a = ?$$

SAT Mathcards

Algebra

To **multiply monomials**, multiply the coefficients and the variables separately. $2a \cdot 3a = (2 \cdot 3)(a \cdot a) = 6a^2$.

KAPLAN

$$6a^2$$

Factoring out a common factor

$$\text{Factor: } 3x^3 + 12x^2 - 6x$$

SAT Mathcards

Algebra

A factor common to all terms of a polynomial can be **factored out**. All three terms in the polynomial $3x^3 + 12x^2 - 6x$ contain a factor of $3x$. Pulling out the common factor yields $3x(x^2 + 4x - 2)$.

KAPLAN

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

Fold Here

Factoring the difference of squares

$$\text{Factor: } x^2 - 9$$

SAT Mathcards

Algebra

One of the testmaker's favorite factorables is the **difference of squares**. An expression in the form $a^2 - b^2$ factors to $(a - b)(a + b)$. $x^2 - 9$, then, factors to $(x - 3)(x + 3)$.

KAPLAN

$$(x - 3)(x + 3)$$

Solving a linear equation for one variable

If $5x - 12 = -2x + 9$, what is the value of x ?

SAT Mathcards

Algebra

To **solve an equation**, do whatever is necessary to both sides to isolate the variable. To solve the equation $5x - 12 = -2x + 9$, first get all the x 's on one side by adding $2x$ to both sides: $7x - 12 = 9$. Then add 12 to both sides: $7x = 21$. Then divide both sides by 7 to get: $x = 3$.

KAPLAN

$$3$$

Multiplying binomials

$$(x + 3)(x + 4) = ?$$

SAT Mathcards

Algebra

To **multiply binomials**, use FOIL. To multiply $(x + 3)$ by $(x + 4)$, first multiply the **F**irst terms: $x \cdot x = x^2$. Next the **O**uter terms: $x \cdot 4 = 4x$. Then the **I**nner terms: $3 \cdot x = 3x$. And finally the **L**ast terms: $3 \cdot 4 = 12$. Then add and combine like terms: $x^2 + 4x + 3x + 12 = x^2 + 7x + 12$.

KAPLAN

$$x^2 + 7x + 12$$

Factoring the product of binomials

$$\text{Factor: } x^2 - 5x + 6$$

SAT Mathcards

Fold Here

Algebra

To **factor a quadratic expression**, think about what binomials you could use FOIL on to get that quadratic expression. To factor $x^2 - 5x + 6$, think about what **F**irst terms will produce x^2 , what **L**ast terms will produce $+6$, and what **O**uter and **I**nner terms will produce $-5x$. Some common sense and a little trial and error lead you to $(x - 2)(x - 3)$.

KAPLAN

$$(x - 2)(x - 3)$$

Evaluating an algebraic expression

What is the value of $x^2 + 5x - 6$ when $x = -2$?

SAT Mathcards

Algebra

To **evaluate an algebraic expression**, plug in the given values for the unknowns and calculate according to PEMDAS. To find the value of $x^2 + 5x - 6$ when $x = -2$, plug in -2 for x : $(-2)^2 + 5(-2) - 6 = 4 + (-10) - 6 = -12$.

KAPLAN

$$-12$$

Solving for one variable in terms of another

If $3x - 10y = -5x + 6y$, what is the value of x in terms of y ?

SAT Mathcards

Algebra

To **solve an equation for one variable in terms of another** means to isolate the one variable on one side of the equation, leaving an expression containing the other variable on the other side of the equation. To solve the equation $3x - 10y = -5x + 6y$ for x in terms of y , isolate x :

$$3x - 10y = -5x + 6y$$

$$3x + 5x = 6y + 10y$$

$$8x = 16y$$

$$x = 2y$$

KAPLAN

$$2y$$

Solving a quadratic equation

If $x^2 + 12 = 7x$, what are the possible values of x ?

SAT Mathcards

Algebra

To **solve a quadratic equation** on the SAT, put it in the “ $ax^2 + bx + c = 0$ ” form, factor the left side, and set each factor equal to 0 separately to get the two solutions. To solve $x^2 + 12 = 7x$, first re-write it as $x^2 - 7x + 12 = 0$. Then factor the left side:

$$(x - 4)(x - 3) = 0$$

$$x - 4 = 0 \text{ or } x - 3 = 0$$

$$x = 4 \text{ or } 3$$

KAPLAN

4 or 3

Inequalities

What is the complete range of values of x for which $-5x + 7 < -3$ and $-2x + 7 > 1$?

SAT Mathcards

Algebra

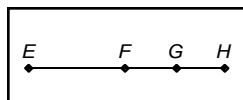
To **solve an inequality**, do whatever is necessary to both sides to isolate the variable. Just remember that when you multiply or divide both sides by a negative number, you must reverse the sign. To solve $-5x + 7 < -3$, subtract 7 from both sides to get: $-5x < -10$. Now divide both sides by -5 , remembering to reverse the sign: $x > 2$. To solve $-2x + 7 > 1$, subtract 7 from both sides to get: $-2x > -6$. Now divide both sides by -2 (reversing the sign) to get: $x < 3$.

KAPLAN

$2 < x < 3$

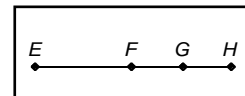
Midpoint

F is the midpoint of EH and G is the midpoint of FH . If $EH = 32$, what is the length of FG ?



SAT Mathcards

Geometry



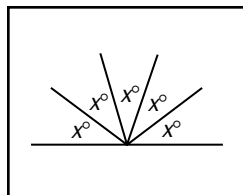
The **midpoint** of a segment divides it into two halves of equal length. Since $EH = 32$ and F is the midpoint of EH , $FH = \frac{32}{2} = 16$. Then, since G is the midpoint of FH , $FG = \frac{16}{2} = 8$.

KAPLAN

8

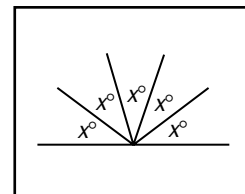
Degrees around a straight line

$x = ?$



SAT Mathcards

Geometry



Angles that add up to a straight line add up to 180° . In the figure on the right, five angles, all marked x° , add up to a straight line.

$$\text{So } x = \frac{180}{5} = 36.$$

KAPLAN

36

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Solving multiple equations with more than one variable

If $4x + 3y = 8$ and $x + y = 3$,
what is the value of x ?

SAT Mathcards

Algebra

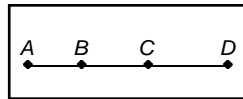
You can solve for two variables only if you have two distinct equations. Combine the equations in such a way that one of the variables cancels out. To solve the two equations $4x + 3y = 8$ and $x + y = 3$, multiply both sides of the second equation by -3 to get: $-3x - 3y = -9$. Now add the two equations; the $3y$ and the $-3y$ cancel out, leaving: $x = -1$.

KAPLAN

-1

Adding and subtracting line segments

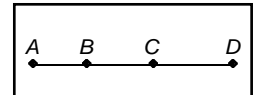
$AC = 9$, $BD = 11$, and $AD = 15$.
What is the length of BC ?



SAT Mathcards

Fold Here

Geometry



When points are on a line or line segment and the order is known, you can add or subtract lengths.

Since $AC = 9$ and $AD = 15$,
 $CD = AD - AC = 15 - 9 = 6$.

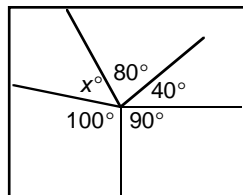
Now, since $BD = 11$ and $CD = 6$,
 $BC = BD - CD = 11 - 6 = 5$.

KAPLAN

5

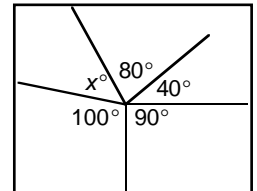
Degrees around a point

$x = ?$



SAT Mathcards

Geometry



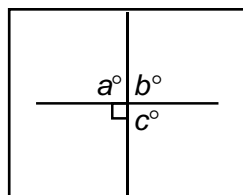
Angles that add up to a full sweep around a point add up to 360° . In the figure on the right,
 $x + 80 + 40 + 90 + 100 = 360$
 $x + 310 = 360$
 $x = 50$

KAPLAN

50

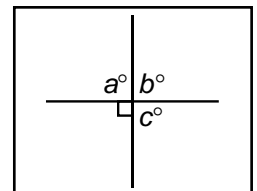
Right angle

$a + b + c = ?$



SAT Mathcards

Geometry



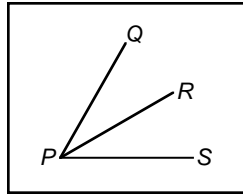
A **right angle** measures 90° and is usually indicated in a diagram by a little box, as in the figure on the right. The two lines in this figure are **perpendicular**; all four angles measure 90° , so $a + b + c = 90 + 90 + 90 = 270$.

KAPLAN

270

Bisector

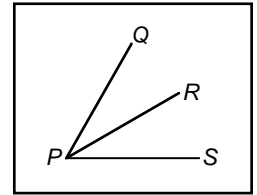
PR bisects angle QPS . If the measure of angle QPS is 60 degrees, what is the measure of angle RPS ?



SAT Mathcards

Geometry

A **bisector** divides an angle into two half angles of equal measure. In the figure on the right, the big angle measures 60° , so the bisector divides it into two 30° angles.

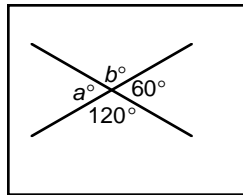


30

KAPLAN

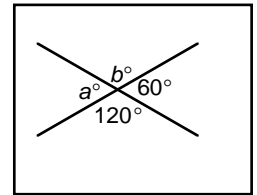
Vertical angles

$a = ?$



Fold Here

When lines intersect, angles across the vertex from each other are called **vertical angles** and are equal. In the figure on the right, the angles marked a° and 60° are vertical, so $a = 60$.



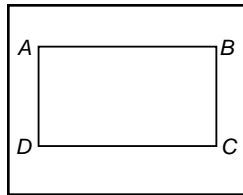
60

SAT Mathcards

KAPLAN

Rectangle

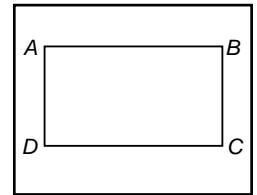
$ABCD$ is a rectangle. What is the measure of angle ABC ?



SAT Mathcards

Geometry

A **rectangle** is a 4-sided figure with 4 right angles. Opposite sides are equal. Diagonals are equal. $ABCD$ is a rectangle, so angle ABC measures 90 degrees.

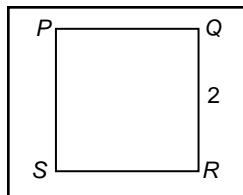


90°

KAPLAN

Square

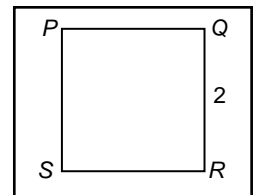
$PQRS$ is a square. What is the length of RS ?



SAT Mathcards

Geometry

A **square** is a rectangle with 4 equal sides. $PQRS$ is a square, so all sides are the same length as QR .

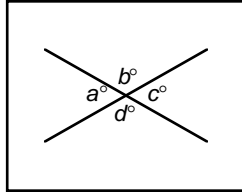


2

KAPLAN

Adjacent angles

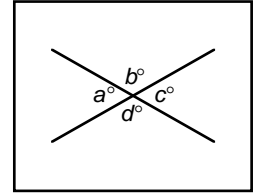
$$a + b = ?$$



SAT Mathcards

Geometry

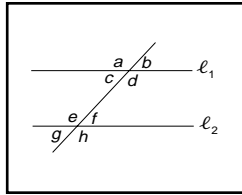
When lines intersect, **adjacent angles** are supplementary and add up to 180° . In the figure on the right, the angles marked a and b are adjacent and supplementary, so $a + b = 180$.



180

Parallel lines and transversals

If ℓ_1 is parallel to ℓ_2 , what 3 angles are equal to angle a ?

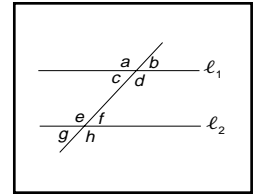


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SAT Mathcards

Geometry

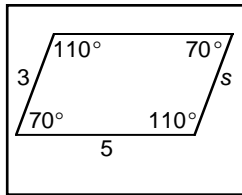
A **transversal** across **parallel lines** forms 4 equal acute angles and 4 equal obtuse angles. In the figure on the right, a is an obtuse angle. The other three obtuse angles d , e , and h are equal to a .



d, e, and h

Parallelogram

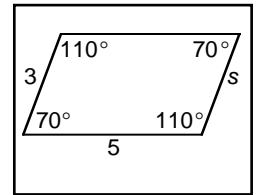
$$s = ?$$



SAT Mathcards

Geometry

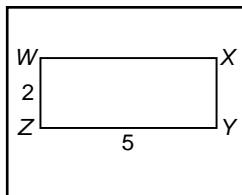
A **parallelogram** has two pairs of parallel sides. Opposite sides are equal. Opposite angles are equal. Consecutive angles add up to 180° . In the figure on the right, s is the length of the side opposite the 3, so $s = 3$.



3

Perimeter of a rectangle

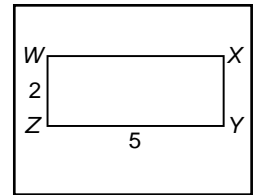
What is the perimeter of rectangle $WXYZ$?



SAT Mathcards

Geometry

The **perimeter of a rectangle** is equal to the sum of the lengths of the 4 sides, that is: $\text{Perimeter} = 2(\text{Length} + \text{Width})$. The perimeter of a 5-by-2 rectangle is $2(5 + 2) = 14$.

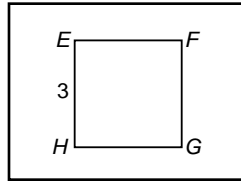


14

KAPLAN

Perimeter of a square

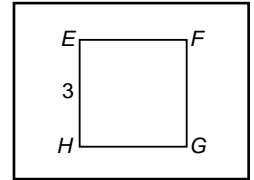
What is the perimeter of square $EFGH$?



SAT Mathcards

Geometry

The **perimeter of a square** is equal to the sum of the lengths of the 4 sides. That is, since all 4 sides are the same length, $\text{Perimeter} = 4(\text{Side})$. If the length of one side of a square is 3, the perimeter is $4 \times 3 = 12$.

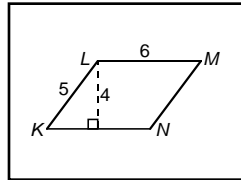


12

KAPLAN

Area of a parallelogram

What is the area of parallelogram $KLMN$?

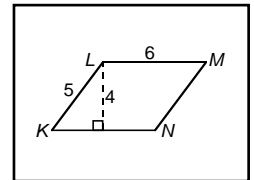


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SAT Mathcards

Geometry

Area of a Parallelogram = $\text{Base} \times \text{Height}$. The height is the perpendicular distance from the base to the top. In the parallelogram $KLMN$, 4 is the height when LM or KN is used as the base. $\text{Base} \times \text{Height} = 6 \times 4 = 24$.

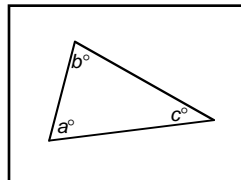


24

KAPLAN

Angles of a triangle

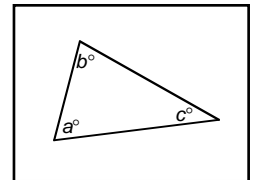
$$a + b + c = ?$$



SAT Mathcards

Geometry

The 3 angles of any triangle add up to 180° .

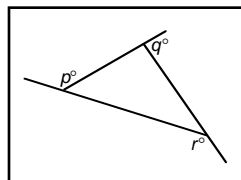


180

KAPLAN

Sum of the exterior angles

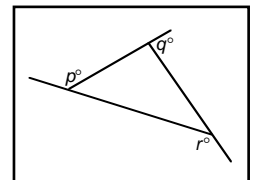
$$p + q + r = ?$$



SAT Mathcards

Geometry

The 3 exterior angles of any triangle add up to 360° .

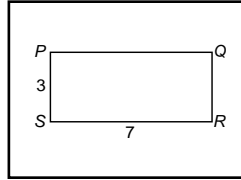


360

KAPLAN

Area of a rectangle

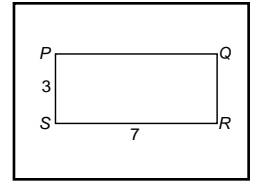
What is the area of rectangle $PQRS$?



SAT Mathcards

Geometry

Area of a Rectangle = Length \times Width. The area of a 7-by-3 rectangle is $7 \times 3 = 21$.

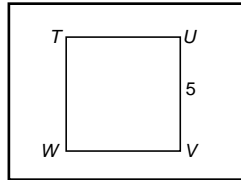


KAPLAN

21

Area of a square

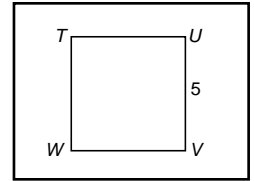
What is the area of square $TUVW$?



SAT Mathcards

Geometry

Area of a Square = (Side)². A square with sides of length 5 has an area of $5^2 = 25$.

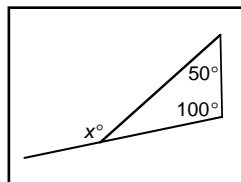


KAPLAN

25

Exterior angle of a triangle

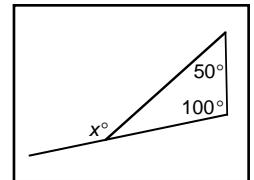
$x = ?$



SAT Mathcards

Geometry

An **exterior angle of a triangle** is equal to the sum of the remote interior angles. The exterior angle labeled x° is equal to the sum of the remote angles: $x = 50 + 100 = 150$.



KAPLAN

150

Triangle inequality theorem

If the length of one side of a triangle is 6 and the length of another side is 4, what is the complete range of possible values for the length of the third side?

SAT Mathcards

Geometry

If you know the lengths of two sides of a triangle, then you also know something about the length of the third side: it's greater than the positive difference and less than the sum of the other two sides. Given a side of 4 and a side of 6, the third side must be greater than $6 - 4 = 2$ and less than $6 + 4 = 10$.

KAPLAN

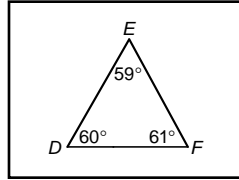
$2 < \text{third side} < 10$

Fold Here

Sides and angles of a triangle

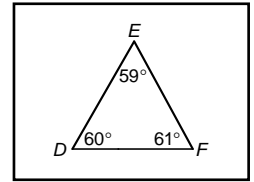
What is the longest side of triangle DEF ?

SAT Mathcards



Geometry

The longest side of a triangle is opposite the biggest angle, and the shortest side is opposite the smallest angle. Angle F is the biggest angle, so the side opposite—side DE —is the longest.

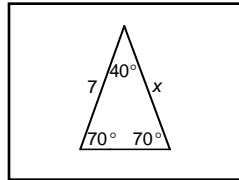


KAPLAN

Isosceles triangle

$x = ?$

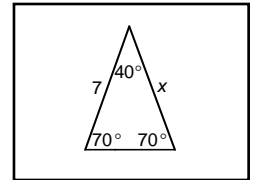
SAT Mathcards



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Geometry

An **isosceles triangle** has 2 equal sides, which are opposite 2 equal angles. The sides opposite the two 70° angles are equal, so $x = 7$.



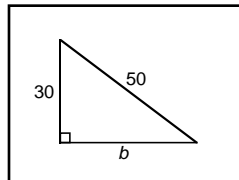
KAPLAN

7

3-4-5 triangle

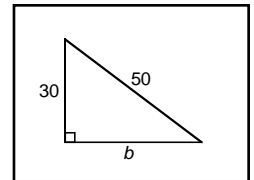
$b = ?$

SAT Mathcards



Geometry

If a right triangle's leg-to-leg ratio is 3:4, or if the leg-to-hypotenuse ratio is 3:5 or 4:5, then it's a 3-4-5 triangle and you won't need to use the Pythagorean theorem to find the third side. Just figure out what multiple of 3-4-5 it is. If one leg is 30 and the hypotenuse is 50, then this is 10 times 3-4-5. The other leg is 40.



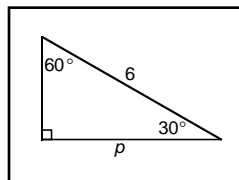
KAPLAN

40

30-60-90 triangle

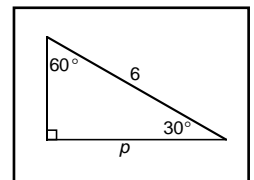
$p = ?$

SAT Mathcards



Geometry

The sides of a **30-60-90 triangle** are in a ratio of $1 : \sqrt{3} : 2$. You don't need to use the Pythagorean theorem. If the hypotenuse is 6, then the shorter leg is half that, or 3; and then the longer leg is equal to the short leg times $\sqrt{3}$, or $3\sqrt{3}$.



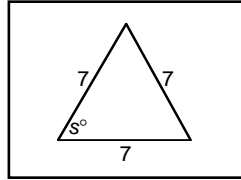
KAPLAN

$3\sqrt{3}$

Equilateral triangle

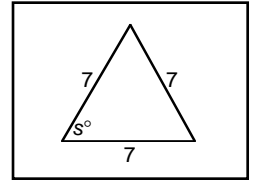
$s = ?$

SAT Mathcards



Geometry

An **equilateral triangle** has 3 equal sides and 3 angles of 60° .



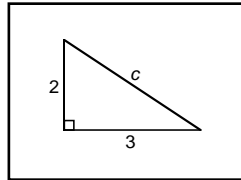
KAPLAN

60

Pythagorean theorem

$c = ?$

SAT Mathcards

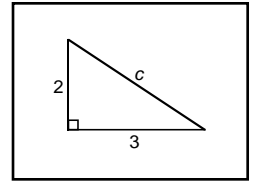


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Geometry

For all right triangles: $(\text{leg}_1)^2 + (\text{leg}_2)^2 = (\text{hypotenuse})^2$. If one leg is 2 and the other leg is 3, then: $2^2 + 3^2 = (\text{hypotenuse})^2$.

$$\text{Hypotenuse} = \sqrt{4 + 9} = \sqrt{13}.$$



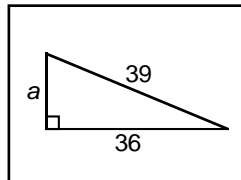
KAPLAN

$\sqrt{13}$

5-12-13 triangle

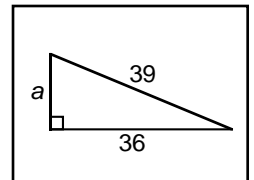
$a = ?$

SAT Mathcards



Geometry

If a right triangle's leg-to-leg ratio is 5:12, or if the leg-to-hypotenuse ratio is 5:13 or 12:13, then it's a 5-12-13 triangle and you won't need to use the Pythagorean theorem to find the third side. Just figure out what multiple of 5-12-13 it is. If one leg is 36 and the hypotenuse is 39, then this is 3 times 5-12-13. The other leg is 15.



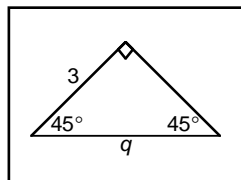
KAPLAN

15

45-45-90 triangle

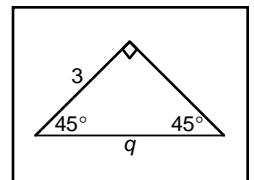
$q = ?$

SAT Mathcards



Geometry

The sides of a **45-45-90 triangle** are in a ratio of $1:1:\sqrt{2}$. You don't need to use the Pythagorean theorem. If one leg is 3, then the other leg is also 3, and the hypotenuse is equal to a leg times $\sqrt{2}$, or $3\sqrt{2}$.

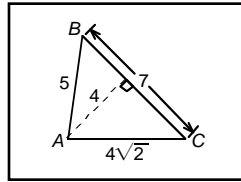


KAPLAN

$3\sqrt{2}$

Area of a triangle

What is the area of triangle ABC ?



SAT Mathcards

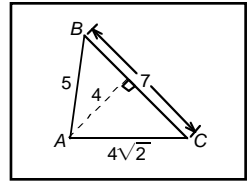
Geometry

Area of a Triangle = $\frac{1}{2}(\text{base})(\text{height})$.

The height is the perpendicular distance between the side that's chosen as the base and the opposite vertex. In this triangle, 4 is the height when the 7 is chosen as the base.

$$\text{Area} = \frac{1}{2}bh = \frac{1}{2}(7)(4) = 14.$$

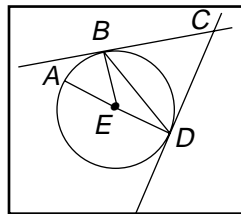
KAPLAN



14

Circle

What line segment in the figure on the right is a chord but not a diameter of the circle with center E ?

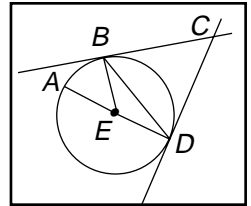


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SAT Mathcards

Geometry

The **diameter** of a circle is the distance across: AD is a diameter. The **radius** is the distance from the center to the edge: AE , BE , and DE are all radii. The radius is half the diameter. A **chord** is a line segment with endpoints on the circle: BD is a chord. A **tangent** is a line that touches the circle at one point. Lines BC and CD are tangents.



KAPLAN

BD

Area of a circle

What is the area of a circle with radius 3 ?

SAT Mathcards

Geometry

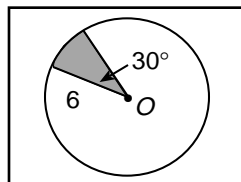
$$A = \pi r^2 = \pi(3)^2 = 9\pi.$$

KAPLAN

9π

Area of a sector

What is the area of the shaded region?



SAT Mathcards

Geometry

A **sector** is a piece of the area of a circle.

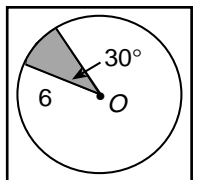
The **Area of a Sector** = $\left(\frac{n}{360}\right)(\pi r^2)$, where n

is the measure of the sector's central angle. If the angle is 30° , the sector is $\frac{30}{360}$ or $\frac{1}{12}$

of the area of the circle: $\left(\frac{30}{360}\right)(\pi)(6^2) =$

$$\left(\frac{1}{12}\right)(36\pi) = 3\pi.$$

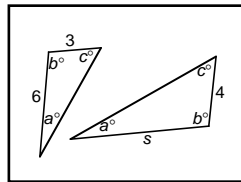
KAPLAN



3π

Similar triangles

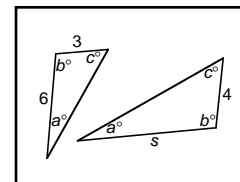
$s = ?$



SAT Mathcards

Geometry

Similar triangles have the same shape: corresponding angles are equal and corresponding sides are proportional. The triangles on the right are similar because they have the same angles. The 3 corresponds to the 4 and the 6 corresponds to the s .



$$\frac{3}{4} = \frac{6}{s} \quad 3s = 24 \quad s = 8$$

KAPLAN

8

Circumference

What is the circumference of a circle with radius 3 ?

SAT Mathcards

Geometry

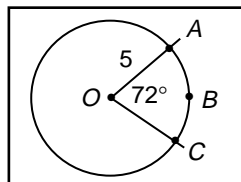
The **circumference** of a circle is the distance around it.
 $C = 2\pi r = 2\pi(3) = 6\pi$.

KAPLAN

6π

Length of an arc

What is the length of arc ABC ?



SAT Mathcards

Geometry

An arc is a piece of the circumference.

The **Length of an Arc** = $\left(\frac{n}{360}\right)(2\pi r)$,

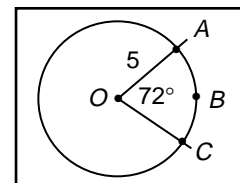
where n is the measure of the arc's central angle. If the angle is 72° , then the arc length is $\frac{72}{360}$ or $\frac{1}{5}$ of the

circumference: $\left(\frac{72}{360}\right)(2\pi)(5) = \left(\frac{1}{5}\right)(10\pi)$

= 2π .

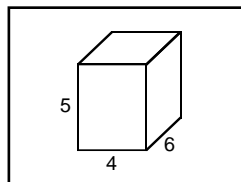
KAPLAN

2π



Volume of a rectangular solid

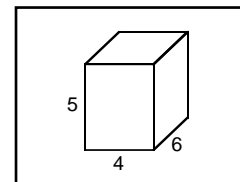
What is the volume of the rectangular box on the right?



SAT Mathcards

Geometry

Volume of a Rectangular Solid = Length \times Width \times Height. The volume of a 4 by 5 by 6 box is $4 \times 5 \times 6 = 120$.



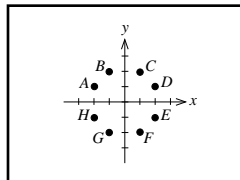
KAPLAN

120

Fold Here

Plotting points on the coordinate plane

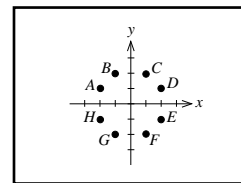
Which point represents $(-1, 2)$?



SAT Mathcards

Geometry

The first number in an ordered pair is the x -coordinate and tells how far to go to the right or left. The second number is the y -coordinate and tells how far to go up or down. To plot $(-1, 2)$, go left 1 and up 2.



B

KAPLAN

Slope

What is the slope of the line that contains the points $A(2, 3)$ and $B(0, -1)$?

Fold Here

Geometry

Slope = $\frac{\text{change in } y}{\text{change in } x} = \frac{\text{rise}}{\text{run}}$. The slope of the line that contains the points $A(2, 3)$ and $B(0, -1)$ is

$$\frac{y_B - y_A}{x_B - x_A} = \frac{-1 - 3}{0 - 2} = \frac{-4}{-2} = 2$$

2

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Distance between points

What is the distance between $P(1, 1)$ and $Q(7, 9)$?

SAT Mathcards

Geometry

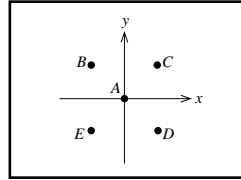
The SAT rarely calls for the "Distance Formula." To find the **distance between points**, use the Pythagorean theorem or special right triangles. The difference between the x 's is one leg and the difference between the y 's is the other leg. Here one leg is $7 - 1 = 6$ and the other leg is $9 - 1 = 8$. This triangle is 2 times the 3-4-5 right triangle. The distance between the points is the hypotenuse, which is 2 times 5, or 10.

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10

Quadrants

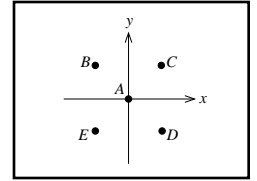
For which point (x, y) in the coordinate plane shown, must it be true that xy is positive and $x + y$ is negative?



SAT Mathcards

Geometry

Remember that the x -coordinate is negative in the two quadrants on the left, and the y -coordinate is negative in the two quadrants on the bottom. C and E are the points for which the product xy is positive. The coordinates of C are both positive, so the sum is positive. The coordinates of E are both negative, so the sum is negative.



KAPLAN

E

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