math

Sunday, July 3, 2022 10:47 PM

Think about this first with numbers.

$(9^5)*(9^3) = (9*9*9*9*9)(9*9*9)$
$= 9*9*9*9*9*9*9*9 = 9^8$

Now, a little more abstractly:
$(7^m)*(7^n) =$
The first factor contains **m** factors of 7, and the second contains **n** factors of 7, so together they create a string of 7's **(m + n)** long

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The next question concerns what happens when we divide powers?

$\frac{a^m}{a^n} = ?$

Again, let's think about numbers first.

$\frac{12^7}{12^3} = \frac{12*12*12*12*12*12*12}{12*12*12} = 12*12*12*12 = 12^4$

If $10^a \times 10^b \times 10^c = 1{,}000{,}000$, and a, b, and c are different positive integers, then $10^a + 10^b + 10^c =$

10^6

if $10^1 + 10^2 + 10^3$
$10 + 100 + 1000 = 1110$

- 1011
- 1100
- 1101
- 1110
- 1111

Which of the following equations is true for all positive values of x and y?

(A) $\sqrt{x} + \sqrt{y} = \sqrt{x+y}$
(B) $\sqrt{x^4y^{16}} = x^2y^4$
(C) $(x\sqrt{y})(y\sqrt{x}) = x^2y^2$
(D) $y\sqrt{x} + y\sqrt{x} = \sqrt{4xy^2}$ ✓
(E) $(x^y)(y^y) = (xy)^{2y}$

$\sqrt{4xy^2} = 2\sqrt{x}y = 2y\sqrt{x}$

A5

$2x^2 + 6 > 40$ Larger than 40

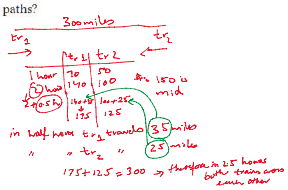
Which values of x satisfy the inequality above?

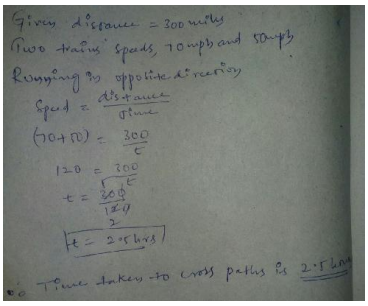
Indicate all such values.

- A −8 → $2 \times 64 + 6 = 134 > 40$ (X)
- B −6 → $2 \times 36 + 6 = 78 > 40$
- C −4 → $2 \times 16 + 6 = 32 + 6 = 38 < 40$
- D −2
- E 2
- F 4
- G 6
- H 8

F 4
G 6
H 8

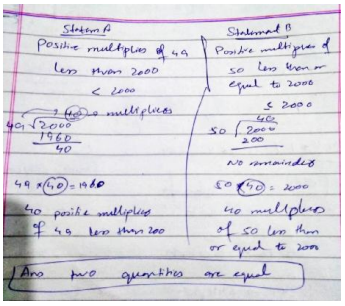
Two trains starting from cities 300 miles apart head in opposite directions at rates of 70 mph and 50 mph, respectively. How long does it take the trains to cross paths?





Column A	Column B
The number of positive multiples of 49 less than 2000	The number of positive multiples of 50 less than or equal to 2000

Ⓐ The quantity in Column A is greater
Ⓑ The quantity in Column B is greater
Ⓒ The two quantities are equal
Ⓓ The relationship cannot be determined from the information given



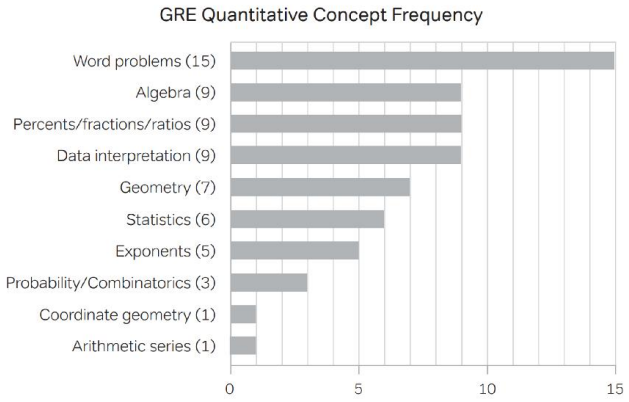
Two cyclists, Mike and Deborah, begin riding at 11 a.m. Mike rides at a constant rate of 40 kilometers per hour (kmh), and Deborah rides at a constant rate of 30 kmh. At noon Mike stops for lunch. At what time will Deborah pass Mike, given that she continues at a constant rate?

Students are tempted to immediately rely on the $d = rt$ formula. They think, *Do I use the formula once for Mike and once for Deborah? Or for only one person? But which person do I use it for?*

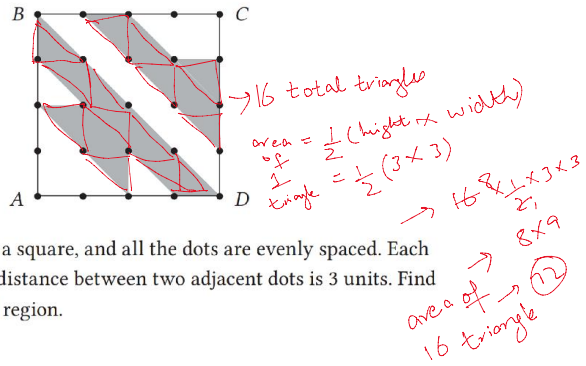
This is an unfortunate quandary; the solution to the question actually relies on figuring out how many kilometers Mike has gone in one hour and how many kilometers behind him Deborah is. There's no formula for this conceptual step. It's only once the conceptual step has been completed that we can use the $d = rt$ formula. The answer, by the way, is 12:20 p.m.

Remember that the essence of problem-solving is just that: solving the problem logically, so you can use the formula when appropriate.

Area of math in GRE



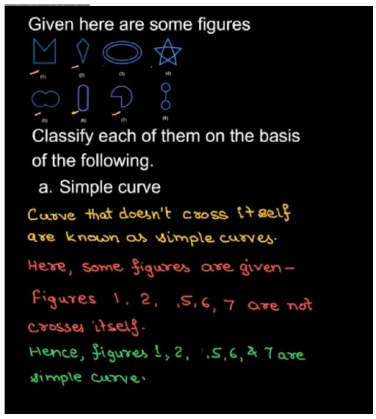
- **Arithmetic** topics include properties and types of integers, such as divisibility, factorization, prime numbers, remainders and odd and even integers; arithmetic operations, exponents and roots; and concepts such as estimation, percent, ratio, rate, absolute value, the number line, decimal representation and sequences of numbers.
- **Algebra** topics include operations with exponents; factoring and simplifying algebraic expressions; relations, functions, equations and inequalities; solving linear and quadratic equations and inequalities; solving simultaneous equations and inequalities; setting up equations to solve word problems; and coordinate geometry, including graphs of functions, equations and inequalities, intercepts and slopes of lines.
- **Geometry** topics include parallel and perpendicular lines, circles, triangles — including isosceles, equilateral and 30°-60°-90° triangles — quadrilaterals, other polygons, congruent and similar figures, three-dimensional figures, area, perimeter, volume, the Pythagorean theorem and angle measurement in degrees. The ability to construct proofs is not tested.
- **Data analysis** topics include basic descriptive statistics, such as mean, median, mode, range, standard deviation, interquartile range, quartiles and percentiles; interpretation of data in tables and graphs, such as line graphs, bar graphs, circle graphs, boxplots, scatterplots and frequency distributions; elementary probability, such as probabilities of compound events and independent events; conditional probability; random variables and probability distributions, including normal distributions; and counting methods, such as combinations, permutations and Venn diagrams. These topics are typically taught in high school algebra courses or introductory statistics courses. Inferential statistics is not tested.



In the figure, *ABCD* is a square, and all the dots are evenly spaced. Each vertical or horizontal distance between two adjacent dots is 3 units. Find the area of the shaded region.

(A) 60
(B) 72 ✓
(C) 81
(D) 96
(E) 120

(Answer and explanation below.)



Example 1.1.1: The positive factors of 100 are 1, 2, 4, 5, 10, 20, 25, 50, and 100.
GRE Math Review

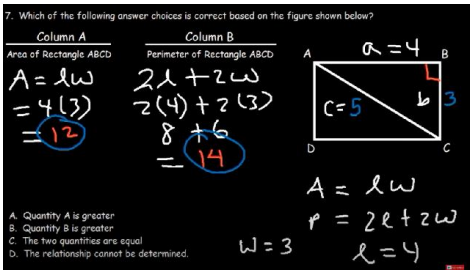
Example 1.1.2: 25 is a multiple of only six integers: 1, 5, 25, and their negatives.

Example 1.1.3: The list of positive multiples of 25 has no end: 25, 50, 75, 100, . . . ; likewise, every nonzero integer has infinitely many multiples.

Example 1.1.4: 1 is a factor of every integer; 1 is not a multiple of any integer except 1 and −1.

Example 1.1.5: 0 is a multiple of every integer; 0 is not a factor of any integer except 0.

When integers are multiplied, each of the multiplied integers is called a **factor** or **divisor** of the resulting product. For example, (2)(3)(10) = 60, so 2, 3, and 10 are factors of 60.



A cylinder has a height of 20 inches and a radius of 5 inches. Which of the following is correct?

Column A	Column B
Volume of the cylinder	Surface area of the cylinder

500π

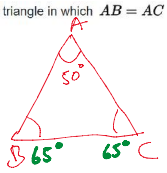
$V = \pi r^2 h = \pi(5)^2(20) = 500\pi$

$SA = 2\pi r^2 + 2\pi rh = 2\pi(5)^2 + 2\pi(5)(19) = 50\pi + 200\pi = 250\pi$

A. The quantity in column A is greater
B. The quantity in column B is greater
C. The two quantities are equal

$\triangle ABC$ is an isosceles triangle in which $AB = AC$ and $\angle A = 50°$ degrees. Find the measure of $\angle B$ and $\angle C$.

- $45°$ each
- $80°$ each
- $60°$ each
- $65°$ each ✓



$AB = AC$

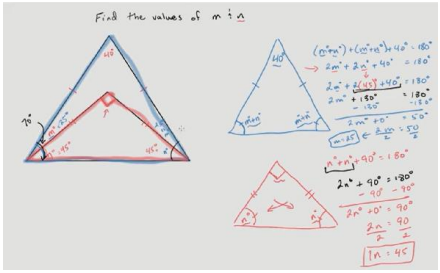
total angles in triangle $= 180°$

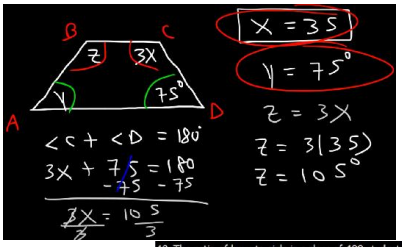
$180° - 50° = 130°$

$\angle B$ & $\angle C$ are equal in Isosceles

$130/2 = 65°$

In isosceles triangle , two sides and two angles are same.





In Isosceles trapezoid

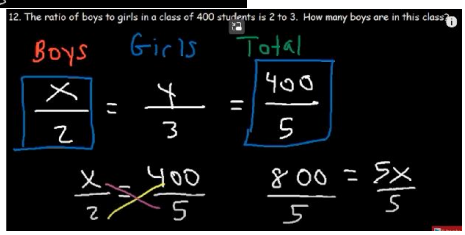
$\angle B \cong \angle C$ | $\angle C + \angle D = 180°$

$\angle A \cong \angle D$ | $3x + 75 = 180$

$3x = 105$

$x = 35°$

$Z = 105°$



https://rb.gy/tpwzdl

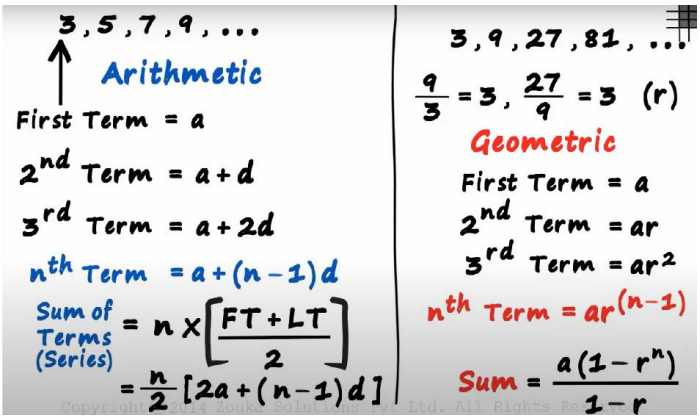
Quick Multiplication

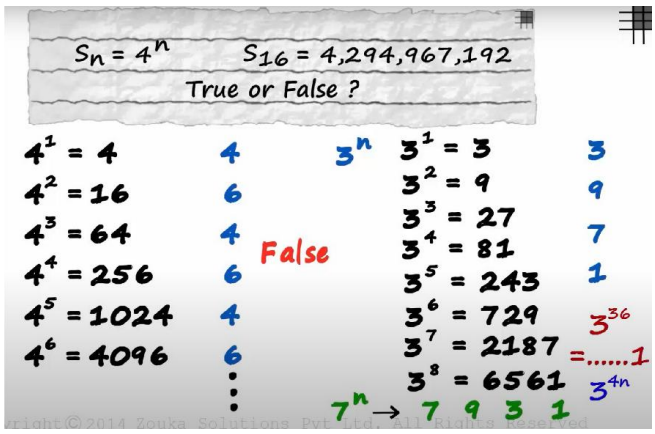
96 −4
× 94 −6
90 24

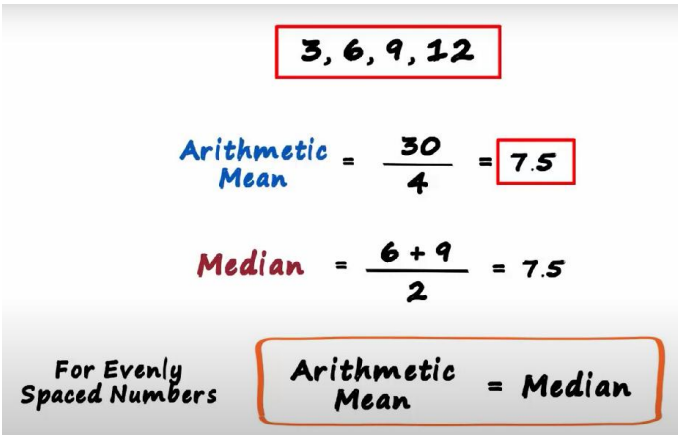
Add
Multiply

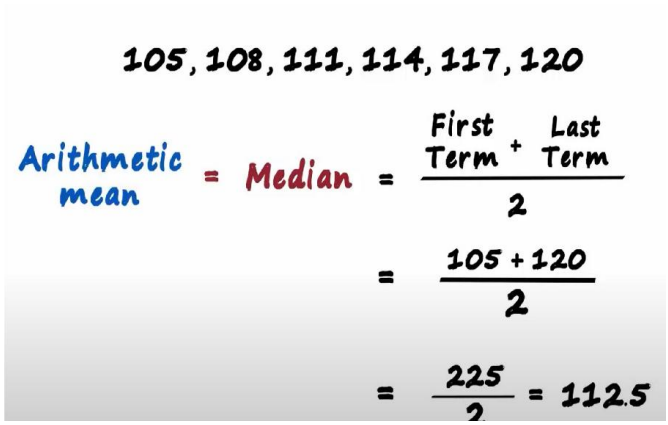
① Base 100
② Subtract 96 − 100 = −4
94 − 100 = −6

Answer


3, 5, 7, 9, ...
Arithmetic
First Term = a
2nd Term = a + d
3rd Term = a + 2d
nth Term = a + (n − 1)d
Sum of Terms (Series) = n × [(FT + LT)/2]
= n/2 [2a + (n − 1)d]
3, 9, 27, 81, ...
9/3 = 3, 27/9 = 3 (r)
Geometric
First Term = a
2nd Term = ar
3rd Term = ar²
nth Term = ar^(n−1)
Sum = a(1 − r^n)/(1 − r)


Sn = 4^n
S16 = 4,294,967,192
True or False ?
4¹ = 4 4
4² = 16 6
4³ = 64 4
4⁴ = 256 6
4⁵ = 1024 4
4⁶ = 4096 6
False
3^n
3¹ = 3 3
3² = 9 9
3³ = 27 7
3⁴ = 81 1
3⁵ = 243
3⁶ = 729 3^36
3⁷ = 2187 =.....1
3⁸ = 6561 3^4n
7^n → 7 9 3 1


3, 6, 9, 12
Arithmetic Mean = 30/4 = 7.5
Median = (6 + 9)/2 = 7.5
For Evenly Spaced Numbers
Arithmetic Mean = Median


105, 108, 111, 114, 117, 120
Arithmetic mean = Median = (First Term + Last Term)/2
= (105 + 120)/2
= 225/2 = 112.5