The GMAT Pill Study Method
Quant: Problem Solving Pill

Questions and Video Explanations

+ Formula Sheets

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1

Algebra

If $x \neq 0$, then $\frac{\sqrt{x^2}}{x} =$

- -1
- 0
- 1
- x
- $\frac{|x|}{x}$

See Video Explanation

2

Geometry

If two sides of a triangle have lengths 2 and 5, which of the following could be the perimeter of the triangle?

I. 9
II. 15
III. 19

- None
- I only
- II only
- II and III only
- I, II, and III

See Video Explanation

3

Number Properties

If n + xy = n and x is not equal to 0, which of the following must be true?

- x > y
- x + y =0
- y = 0
- x - y = 0
- xy = 1

See Video Explanation

4

Number Properties

If *n* denotes a number to the left of 0 on the number line such that the square of *n* is less than $\frac{1}{100}$, then the reciprocal of *n* must be

- less than -10
- between -1 and $-\frac{1}{10}$
- between $-\frac{1}{10}$ and 0
- between 0 and $\frac{1}{10}$
- greater than 10

See Video Explanation

5

Number Properties

The product X of two prime numbers is between 17 and 55. If one of the prime numbers is greater than 2 but less than 6 and the other is greater than 13 but less than 25, then X=

- 18
- 24
- 34
- 44
- 51

See Video Explanation

6

Sequences

In the infinite sequence a_1, a_1, a_1, ?, a_n, ?, each term after the first is equal to twice the previous term. If a_5, - a_2, = 12, what is the value of a_1?

- 4
- $\frac{24}{7}$
- 2
- $\frac{12}{7}$
- $\frac{6}{7}$

See Video Explanation

7

Algebra

If xy + z = x(y + z), which of the following must be true?

- x = 0 and z = 0
- x = 1 and y = 1
- y = 1 and z = 0
- x = 1 or y = 0
- x = 1 or z = 0

See Video Explanation

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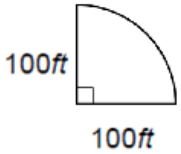
Geometry



The figure shown represents a piece of land that is in the shape of a quarter circle. If the land is enclosed by a fence, which of the following is closest to the length, in feet, of the fence?

- 278
- 341
- 357
- 400
- 441

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See Video Explanation

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Sequences

If a equals the sum of the even integers from 2 to 200, inclusive, and b equals the sum of the odd integers from 1 to 199, inclusive, what is the value of a - b?

- 10
- 100
- 190
- 200
- 210

See Video Explanation

10

Exponents

If $(500)(7{,}000) = (350)(100^x)$, what is the value of x?

- 5
- 4
- 3
- 2
- 1

See Video Explanation

11

Hypothetical Formulas

For all positive integers m, #m# = 3m when m is odd and #m# = .5m when m is even. Which of the following is equivalent to (#9#)(#6#)?

- #81#
- #54#
- #36#
- #27#
- #18#

See Video Explanation

12

Algebra

Sarah paid a sales tax of 8 percent on her purchase. If the sales tax had been only 5 percent, she would have paid $12 less in sales tax on her purchase. What was the total amount that Sarah paid for her purchase including sale tax?

- $368
- $380
- $400
- $420
- $432

See Video Explanation

13

Roots

$\sqrt{184{,}513}$ is between

- 100 and 200
- 200 and 300
- 300 and 400
- 400 and 500
- 500 and 600

See Video Explanation

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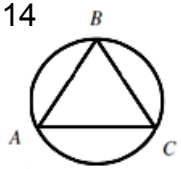
Geometry



In the figure above, equilateral triangle ABC is inscribed in the circle. If the length of arc ABC is 44, what is the approximate diameter of the circle?

- 12
- 15
- 18
- 21
- 24

See Video Explanation

15

Inequalities

Which of the following inequalities has a solution set that, when graphed on the number line, is a single line segment of finite length?

- $x^4 \geq 1$
- $x^3 \leq 27$
- $x^2 \geq 16$
- $2 \leq |x| \leq 5$
- $2 \leq 3x + 4 \leq 6$

See Video Explanation

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Number Properties

If $0 < r < 1 < s < 2$, which of the following must be less than 1?

I. r/s
II. rs
III. $s - r$

- I only
- II only
- III only
- I and II
- I and III

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Algebra

The total price of a basic TV and a TV stand was $1,500. If the same TV had been purchased with a next generation 3D TV whose price was $2,000 more than the price of the basic TV, then the price of the TV stand would have been one eighth of that total. What was the price of the basic TV?

- $900
- $1,000
- $1,100
- $1,200
- $1,300

See Video Explanation

18

Factorials

Which of the following is an integer?

I. $\frac{12!}{6!}$

II. $\frac{12!}{7!}$

III. $\frac{12!}{7!5!}$

- I only
- II only
- III only
- I and II only
- I, II, and III

See Video Explanation

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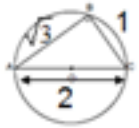
Geometry



In the figure above, the radius of the circle with center *O* is 1 and *BC* = 1. What is the area of the triangular region *ABC*

- $\frac{\sqrt{2}}{2}$
- $\frac{\sqrt{3}}{2}$
- 1
- $\sqrt{2}$
- $\sqrt{3}$

See Video Explanation

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Geometry

A thin piece of wire 40 meters long is cut into two pieces. One piece is used to form a circle with radius *r*, and the other is used to forma square. No wire is left over. Which of the following represents the total rea, in square meters, of the circular and the square regions in terms of *r*?

- πr^2
- $\pi r^2 + 10$
- $\pi r^2 + \frac{1}{4}\pi^2 r^2$
- $\pi r^2 + (40 - 2\pi r)^2$
- $\pi r^2 + (10 - \frac{1}{2}\pi r)^2$

See Video Explanation

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Algebra

The average (arithmetic mean) of 20, 40, and 60 is 5 more than the average of 10, 70, and what number?

- 15
- 25
- 35
- 45
- 55

See Video Explanation

22

Wordy Word Problems

To celebrate a colleague's retirement, the T coworkers in an office agreed to share equally the cost of a catered lunch. If the lunch costs a total of x dollars and S of the coworkers fail to pay their share, which of the following represents the additional amount, in dollars, that each of the remaining coworkers would have to contribute so that the cost of the lunch is completely paid?

- $\frac{x}{T}$
- $\frac{x}{T-S}$
- $\frac{Sx}{T-S}$
- $\frac{Sx}{T(T-S)}$
- $\frac{x(T-S)}{T}$

See Video Explanation

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Fractional Exponents

If $\left(\frac{1}{5}\right)^{m}\left(\frac{1}{4}\right)^{18}=\frac{1}{2(10)^{35}}$, then m =

- 17
- 18
- 34
- 35
- 36

See Video Explanation

24

Exponents

If $(5^{21})(4^{11}) = (2)(10^{x})$, what is the value of x?

- 11
- 21
- 22
- 23
- 32

See Video Explanation

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Wordy Word Problems

Alice's take-home pay last year was the same each month, and she saved the same fraction of her take-home pay each month. The total amount of money that she had saved at the end of the year was 3 times the amount of that portion of her monthly take-home pay that she did not save. If all the money that she saved last year was from her take-home pay, what fraction of her take-home pay did she save each month?

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

See Video Explanation

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Functions

For which of the following functions is $f_{(a+b)} = f_{(a)} + f_{(b)}$ for all positive numbers a and b?

- $f_{(x)} = x^2$
- $f_{(x)} = x + 1$
- $f_{(x)} = \sqrt{x}$
- $f_{(x)} = \frac{2}{x}$
- $f_{(x)} = -3x$

See Video Explanation

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Functions

For all numbers x such that $x \neq 1$, if $g_{(x)}$ is defined by $g_{(x)} = \frac{x^2+2}{x-1}$, then $\left(\frac{1}{g_{(2)}}\right)\left(\frac{1}{g_{(x)}}\right) =$

- $\frac{6(x-1)}{x^2+2}$
- $\frac{6(x^2+2)}{x-1}$
- $\frac{x^2+2}{2(x-1)}$
- $\frac{x-1}{6(x^2+2)}$
- $\frac{x^2+2}{6(x-1)}$

See Video Explanation

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Roots

If $a > b > 0$, then $\sqrt{a^2-b^2} =$

- $a+b-\sqrt{2ab}$
- $a-b+\sqrt{2ab}$
- $\sqrt{(a-b)^2-2ab}$
- $(\sqrt{a+b})(\sqrt{a-b})$
- $(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})$

See Video Explanation

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Exponents

What is the value of this expression?

$$\frac{1001^2 - 999^2}{101^2 - 99^2}$$

- 1
- 5
- 10
- 100
- 101

See Video Explanation

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Geometry

Points A, B, and, C have xy-coordinates (2,0), (8,12), and (14,0), respectively. Points X, Y, and Z have xy-coordinates (6,0), (8,4), and (10,0), respectively.

What fraction of the area of triangle ABC is the area of triangle XYZ?

- 1/9
- 1/8
- 1/6
- 1/5
- 1/3

See Video Explanation

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Geometry

The figure here is a ring with a thickness shown in black. If the radius of the ring is r and the thickness of the ring is t, then which of the following expressions best describes the area of the ring?

- $\pi(r-t)^2$
- $\pi(r^2-t)^2$
- $2\pi(r-2t)$
- $\pi r(2r-t)$
- $\pi t(2r-t)$

See Video Explanation

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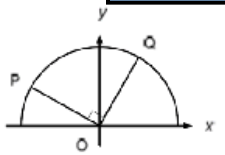
Geometry



In the figure above, points *P* and *Q* lie on the circle with center *O* and have *xy* coordinates $(-\sqrt{3},1)$ and (s, t), respectively. What is the value of *s*?

- $\frac{1}{2}$
- 1
- $\sqrt{2}$
- $\sqrt{3}$
- $\frac{\sqrt{3}}{2}$

See Video Explanation

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Geometry

What is the greatest possible area of a triangular region with one vertex at the center of a circle of radius 1 and the other two vertices on the circle?

- $\frac{\sqrt{3}}{4}$
- $\frac{1}{2}$
- $\frac{\pi}{4}$
- 1
- $\sqrt{2}$

See Video Explanation

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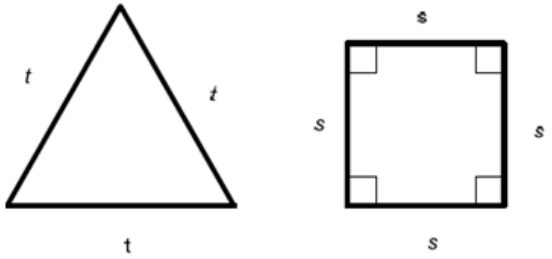
Geometry

If the two regions above have the same area, what is the ratio t:s?



- 2:3
- 16:3
- $4:\sqrt{3}$
- $2:\sqrt[4]{3}$
- $4:\sqrt[3]{4}$

See Video Explanation

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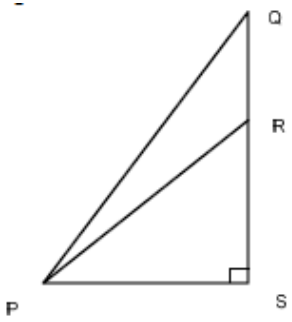
Geometry

In the figure to the right, the sum of the measures of angles PQR and PRQ is 150 degrees. How many degrees greater is the measure of angle PRS than the measure of angle PQR?



- 20
- 30
- 40
- 50
- 60

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Geometry

The perimeter of a certain isosceles right triangle is $32+32\sqrt{2}$. What is the length of the hypotenuse of the triangle?

- 16
- 32
- $8\sqrt{3}$
- $8\sqrt{2}$
- $16\sqrt{2}$

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See Video Explanation

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Number Properties

What is the sum of the different positive prime factors of 660?

- 5
- 10
- 15
- 17
- 21

See Video Explanation

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Combo/Permutations

Jack and Jill work at a hospital with 4 other workers. For an internal review, 2 of the 6 workers will be randomly chosen to be interviewed. What is the probability that Jack and Jill will both be chosen?

- 1/3
- 1/4
- 1/15
- 3/8
- 2/3

See Video Explanation

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Number Properties

If k and t are integers and $k^2 - t^2$ is an odd integer, which of the following must be an even integer?

I. $k + t + 2$
II. $k^2 + 2kt + t^2$
III. $k^2 + t^2$

- None
- I only
- II only
- III only
- I, II, and III

See Video Explanation

40

Combo/Permutations

A committee of three people is to be chosen from four teams of two. What is the number of different committees that can be chosen if no two people from the same team can be selected for the committee?

- 20
- 22
- 26
- 30
- 32

See Video Explanation

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Combo/Permutations

A certain team consists of 4 professors and 6 teaching assistants. How many different teams of 3 can be formed in which at least one member of the group is a professor? (Two groups are considered different if at least one group member is different.)

- 48
- 100
- 120
- 288
- 600

See Video Explanation

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Combo/Permutations

A cube marked 1, 2, 3, 4, 5, and 6 on its six faces. Three colors, red, blue, and green are used to paint the six faces of the cube. If the adjacent faces are painted with the different colors, in how many ways can the cube be painted?

- 3
- 6
- 8
- 12
- 27

See Video Explanation

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Algebra

A bowl was filled with 10 ounces of water, and 0.008 ounce of the water evaporated each day during a 50-day period. What percent of the original amount of water evaporated during this period?

- 0.004%
- 0.04%
- 0.40%
- 4%
- 40%

See Video Explanation

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Exponents

If x is the product of the positive integers from 1 to 9, inclusive, and if i, k, m, and p are positive integers such that $x = 2^i3^k5^m7^p$, then i + k + m + p =

- 4
- 7
- 8
- 11
- 13

See Video Explanation

45

Mixture Problems

A puppy on a controlled diet is fed daily 600 grams of a mixture of two foods, food X and food Y. Food X contains 10% protein and food Y contains 15% protein. If the puppy's diet provides exactly 76 grams of protein daily, how many grams of food X are in the mixture.

A) 200
B) 280
C) 300
D) 320
E) 400

See Video Explanation

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Mixture Problems

24 oz of Juice P and 25 oz of Juice V are mixed to make smoothies X and Y. The ratio of P to V in smoothie X is 4 to 1, in Y is 1 to 5. How many ounces of Juice P is contained in the Smoothie X?

A) 5
B) 10
C) 15
D) 20
E) 25

See Video Explanation

47

Mixture Problems

In what ratio must rice at $9.30/kg be mixed with rice at $10.80/kg So that the mixture is worth $10/kg?

A) 1:3
B) 9:4
C) 9:7
D) 11:9
E) 11:7

See Video Explanation

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Mixture Problems

10kg of a mixture contains 30% sand and 70% soil. In order to make the mixture contain equal quantities of soil and sand, how much of the mixture is to be removed and replaced with pure sand?

A) 25/7
B) 20/7
C) 2
D) 3
E) 17/13

See Video Explanation

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Tables

Of the 50 high school students, 40 percent will be assigned to team A and remaining 60 percent to team B.However 70% of the researchers prefer team A and 30 % prefer team B.

What is the lowest number of high school students who will not be assigned to the team they prefer?

A) 10
B) 15
C) 20
D) 25
E) 30

See Video Explanation

50

Rates

Of the 50 high school students, 40 percent will be assigned to math class and remaining 60 percent to reading class.However 70% of the researchers prefer team A and 30 % prefer team B.

What is the highest number of high school students who will not be assigned to the team they prefer?

A) 30
B) 35
C) 40
D) 45
E) 50

See Video Explanation

51

Rates

A taxi leaves the Point A 5 hours after a bus left the same spot. The bus is traveling 30 mph slower than the taxi. Find the speed of the taxi, if it overtakes the bus in three hours.

A) 36
B) 38
C) 40
D) 42
E) 44

See Video Explanation

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Rates

Two cars start at the same time from opposite ends of a highway that is 45 miles long. One car is riding at 14 mph and the second cyclist is riding at 16 mph. How long after they begin will they meet?

A) 1
B) 1.2
C) 1.25
D) 1.35
E) 1.5

See Video Explanation

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Exponents

What is the greatest prime factor of $8^{12} - 2^{30}$?

- 2
- 3
- 5
- 7
- 11

See Video Explanation

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Venn Diagram

Of the 200 students at University XYZ majoring in one or more of the engineering disciplines, 130 are majoring in electrical and 150 are majoring in mechanical. If at least 30 of the students are not majoring in either electrical or mechanical, then the number of students majoring in both electrical and mechanical could be any number from

- 30 to 70
- 70 to 100
- 110 to 130
- 130 to 150
- 150 to 170

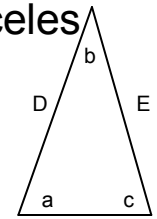
See Video Explanation

Answer Key:

1) E
2) A
3) C
4) A
5) E
6) E
7) E
8) C
9) B
10) D
11) D
12) E

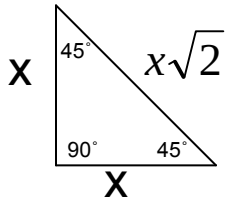
For solutions to the remaining questions, login here.

Isosceles



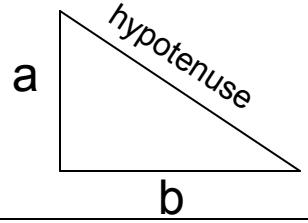
If angle a = c, then
side length D = E
When this condition is met, the triangle is called an isosceles

Right Isosceles



A right isosceles is a specific type of isosceles triangle where the angles are 45-45-90 as shown.

Right Isosceles



Hypotenuse = ?

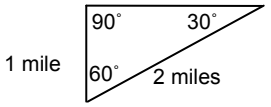
$$a^2 + b^2 = c^2$$

Hypotenuse =

$$\sqrt{a^2 + b^2}$$

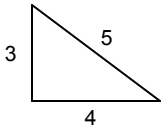
Triangle Area =

$$\frac{1}{2} base * height$$

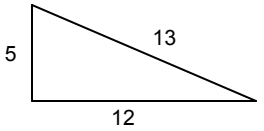


$$x - 2x - x\sqrt{3}$$

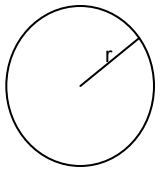
Right Triangle



Know these triangle ratios!



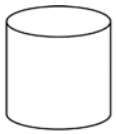
Circle



Area = πr^2

Circumference = π*diameter (Rhymes: “pi” “di”)

Cylinder/Sphere



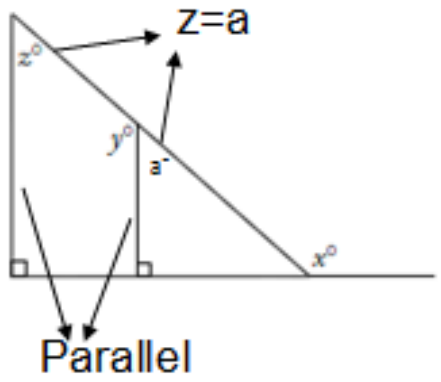
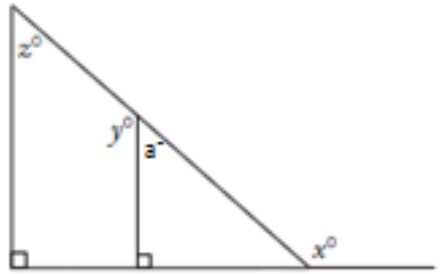
Volume of cylinder = Area of circle * how far that circle extends

Volume of cylinder = πr^2 * height

Volume sphere = $\frac{4}{3}\Pi r^3$

See Video Explanation

Parallel Lines and Angles

Parallel Lines  	You know the two lines are parallel because of the 90 degree marks at the bottom left. When this is the case, then you can just eyeball and confidently say "angle z" = "angle a"
Angle Diagrams  	If z = 40, then what's the sum of x and y? Well, we know 1) z=a=40 2) x= 90 +a (common concept tested) 3) y + a = 180 (straight line) Just plug in 40 into #2 and #3, and you'll get x=130 Y=180 – 40 = 140 So x+y = 130+140+270

Sum of Sequences

Sequences: Sum, Average, # of terms

Sum: What is sum of all multiples of 3 from 1 to 100?

Average: What is the average of all these multiples of 3?

# of Terms: How many numbers are multiples of 3 between 1 and 100?

RULE: avg value of each term = average (1st term and last term)

See Video Explanation

Step 1: Find # of terms→Start small, think:
3 is the 1st term
30 is the 10th term
90 is the 30th term
99 is the 33rd term→ so there are 33 terms

Step 2: The easiest way to find the sum is to multiply the # of terms by the average value of each term. So we need to find the average value!

So in this case, avg(3 and 99) = (3+99)/2 = 102/2 = 51 = average term

Step 3: Sum = # terms * avg value
= (# from Step 1) * (# from step 2)
= 33 terms * 51 = 1683

Sum of Sequences

Sequences: Sum, Average, # of terms

Sum: What is sum of all even numbers from 1 to 100?

Average: What is the average of all these multiples of 2?

# of Terms: How many numbers are multiples of 2 between 1 and 100?

See Video Explanation

Step 1: Find # of terms:
2 is the 1st term
100 is the 50th term→ so there are 50 terms

Step 2: The easiest way to find the sum is to multiply the # of terms by the average value of each term. So we need to find the average value!

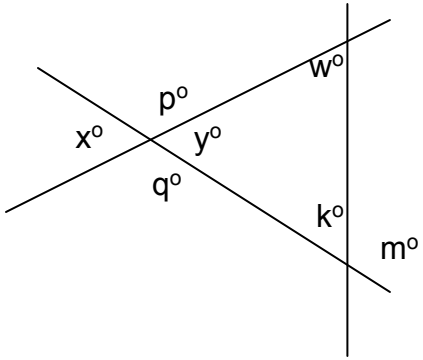
RULE: avg value of each term = average (1st term and last term)

So in this case, avg(2 and 100) = (2+100)/2 = 102/2 = 51 = average term

Step 3: Sum = # terms * avg value
= (# from Step 1) * (# from step 2)
= 50 terms * 51 = 2550

Angles

Lines



You should know…

x=y

p=q

(x+q)=(q+y)=(p+x)=(p+y)=180

(y+w+k)=(m+k)=180

m=y+w (This one is common!)

See Video Explanation

Combinations/Permutations (n Choose r)

Strategy #1: Count them

How many triplets (teams of 3) can you make in a group of 5 people?

1 2 3 4 5

10 possible triplets

Strategy #2: Use Formula

Q1) How many triplets (teams of 3) can you make in a group of 5 people?

n=total # (5)

r=size of selected group (3)

$$\frac{n!}{r!(n-r)!} = \frac{5!}{3!(5-3)1!} = \frac{5!}{3!2!} = \frac{1*2*3*4*5}{(1*2*3)(1*2)} = \frac{4*5}{2} = 10$$

Q2) How many pairs (teams of 2) can you form with 6 people?

n=6

r=2

$$\frac{n!}{r!(n-r)!} = \frac{6!}{2!(6-2)1!} = \frac{6!}{2!4!} = \frac{1*2*3*4*5*6}{(1*2)(1*2*3*4)} = \frac{5*6}{2} = 15$$

See Video Explanation

Math Equations/Relationships

Averages (you should already know this)
Arithmetic Mean = add them all up, divide by the # of items
Median = the middle number of a set of numbers

In a set of 5 (odd #) ascending numbers, the median is the 3rd number.

In a set of 6 (even #) ascending numbers, the median is the average of 3rd and 4th terms

{3, 4, 7, 9}:
mean = (3+4+7+9)/4 = 23/4
median = (4+7)/2 = 5.5

Ratios $\frac{a}{b} = \frac{c}{d}$

- a:c = b:d
- Cross products are equivalent
  - a*d = b*c

Exponent Operations
Subtraction: $2^4 - 2^2 = 16-12 = 12$
Multiplication: $2^4 (2^2) = 2^6$ [Keep the base, add the exponents!]
Addition: $2^4 + 2^2 = 16 + 4 = 20$
Division: $2^4/2^2 = 2^{4-2} = 2^2$ [Keep the base, subtract the exponents!]

Factorials
0! = 1
4! = 4*3*2*1 =24
4! = 4* 3! = 24
5! = 120

$$(\frac{1}{2})^{-3}(\frac{1}{8})^{-2}(\frac{1}{16})^{-1} = ?$$
$$= (2^{-1})^{-3}(2^{-3})^{-2}(2^{-4})^{-1}$$
$$= 2^{3+6+4} = 2^{13}$$
If all the answer choices are in base 1/2 instead of 2, then convert
$$= (\frac{1}{2})^{-13}$$

See Video Explanation

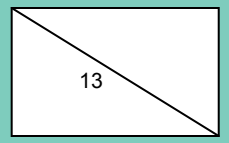
#8: Geometry Formulas

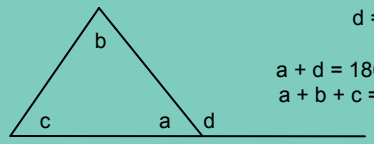
Given diagonal is 13, what is the circumference of the rectangle?

Do you have enough info?

Generally, no. You need to at least know the ratio of the width/length OR be told that the width and length MUST be integers.

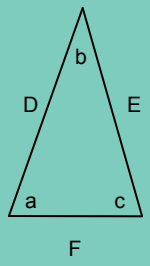
Note: Diagrams on GMAT are NEVER drawn to scale!!





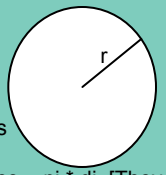
d = b + c

a + d = 180 [straight line]
a + b + c = 180 [triangle]



If 2 sides are same length,
then those angles opposite are equal
[if a=c → D=E]

Likewise…
If 2 angles are equal,
then the edges opposite of those angles are of equal length



CIRCLE/Arcs

Circumference = pi * di [They rhyme!]
Note: Diameter (di) = 2r

Area of circle = pi * r^2

3D: Volume of Sphere = 4/3 pi * r^3

Expressions You Should Know Without Thinking

Expression	Exponentials You Should Know Quickly
2^3	8
2^4	16
2^5	32
3^2	9
3^3	27
3^4	81
4^2	16
4^3	64
5^2	25
5^3	125
5^4	625
6^2	36
7^2	49
8^2	64
9^2	81
10^2	100
11^2	121
12^2	144
x^0	1 (always)

$0! = 1$

D=R * T
Distance = Rate * Time

(Total #) * (%) = (Actual #)

Ex: $5^3 * 5^x = 5^{3+x}$

$5^{-3} = \frac{1}{(5^3)}$

$(-2)^2 = 4$
$(-2)^3 = -8$
$(-2)^4 = 16$
$(-2)^5 = -32$
Odd exponents keep sign of base

Fraction	Decimal	Percent
$\frac{1}{100}$	.01	1%
$\frac{1}{50}$	.02	2%
$\frac{1}{25}$	.04	4%
$\frac{1}{20}$	.05	5%
$\frac{1}{10}$	.1	10%
$\frac{1}{8}$	.125	12.5%
$\frac{1}{6}$	$.1\overline{6}$	$\approx$ 16.6%
$\frac{1}{5}$	.2	20%
$\frac{1}{4}$	.25	25%
$\frac{3}{10}$	.3	30%
$\frac{1}{3}$	$.\overline{3}$	$\approx$ 33.3%
$\frac{2}{5}$	.4	40%

Fraction	Decimal	Percent
$\frac{1}{2}$	.5	50%
$\frac{3}{5}$	.6	60%
$\frac{2}{3}$	$.\overline{6}$	$\approx$ 66.6%
$\frac{7}{10}$	.7	70%
$\frac{3}{4}$	.75	75%
$\frac{4}{5}$	.8	80%
$\frac{9}{10}$	.9	90%
$\frac{1}{1}$	1	100%
$\frac{5}{4}$	1.25	125%
$\frac{4}{3}$	$1.\overline{3}$	$\approx$ 133%
$\frac{3}{2}$	1.5	150%

Pos/Neg Fractional Exponents

$$8^{1/2} = \sqrt{8}$$

$$8^{1/3} = \sqrt[3]{8}$$

$$8^{0} = 1$$

$$8^{45} = (2^{3})^{45} = 2^{135}$$

$$8^{3/7} = \sqrt[7]{8^{3}}$$

$$8^{-3} = \frac{1}{8^{3}} = \frac{1}{(2^{3})^{3}} = \frac{1}{2^{9}}$$

$$8^{-1/3} = \frac{1}{8^{1/3}} = \frac{1}{\sqrt[3]{8}} = \frac{1}{2}$$

Make sure you are familiar with all formats and switching between them back and forth!

See Video Explanation

Rates

D=R # T
Distance = Rate # Time

EVERYBODY Knows this formula. Obviously knowing this formula is not going to be enough. The GMAT will test you on variations of this formula

What do you do when there are multiple rates involved??

Rates Must Add Up!

$R_1 + R_2 = R_{Total}$

The Inverse of Times Must Add Up!

$$\frac{1}{T_1} + \frac{1}{T_2} = \frac{1}{T_{Total}}$$

See Video Explanation

Additional Rules You should know

See Video Explanation $\sqrt[\text{even}]{x} \geq 0$ Rule: $\sqrt{x^2} = \lvert x \rvert$	So $\sqrt[4]{81}$=3 only, not +3 and -3. **Even roots have only a positive value on the GMAT.** (well if x=0 then it will obviously be 0). When the GMAT provides the square root sign for an even root, such as a square root, then the only accepted answer is the positive root.
When we see $y = \sqrt{x^2}$ then: $y = \lvert x \rvert$	This means y cannot be negative, but x can be negative
Odd roots will have the same sign as the base of the root	On the exam… $\sqrt[3]{64} = +4$ $\sqrt[3]{-27} = -3$

Translating fancy word problems

- “There are twice as many Computers as there are printers.”
    - C=2p (NOT 2c = p !!!!!)
- “There are 10 more grapes than apples,and one fourth as many appples as pears.” Assume g= grape,a = apple ,p = pears
    - G=10+a
    - A= (1/4)p

See Video Explanation

Translating fancy word problems

If Jack bought a computer for $1000 more than a generic model, then the price of that computer would have been 8 times the value of the accompanying bonus wireless router, which is 1/4th the price of the generic model. What is the price of the computer?

Step 1: Assign letters c = computer, g = generic, b = bonus

Step 2: Reread the paragraph and substitute variables in:
c = $1000 + g
c = 8b
b = (1/4) g

See Video Explanation

Step 3: Identify that there are 3 variables but also 3 unknowns, so it is solvable!

Tricky wordings

- Three Friends sit down to eat 14 slices of Pizza. If two of the Friends eat the same number of slices,and the third eats two more slices than each of the other two, how many slices are eaten by the third friend?
- Step #1: Assign letter variables:
- f_1 = friend #1
  f_2 = friend #2
  f_3 = friend #3
    - $F_1 + f_2 + f_3 = 14$ "Three Friends sit down to eat 14 slices of Pizza."
    - $F_1 = f_2$ "If two of the Friends eat the same number of slices"
    - $F_3 = 2 + f_1$ "The third eats two more slices than each of the other two"
    - $F_3 = 2 + f_2$ "The third eats two more slices than each of the other two"
    - $F_3 = ?$ "How many slices are eaten third friend?"
- Recognize that you have 3 unknowns, but also more than the necessary 3 equations to solve for everything! So this is solvable!
- Let's do it:
    - $2f_2 + f_3 = 14$
    - $2 (f_3 – 2) + f_3 = 14$
    - $3f_3 – 4 = 14$
    - $F_3 = 18/3 = 6$

See Video Explanation

Inequalities (Absolute Value)

Example: $|x-2| < 4$

Whenever you have absolute values on one side, then There are two possibilities:

1) $x-2 < 4$	→ easy
2) $x-2 > -4$	→ 1) negate the other side AND 2) flip the sign so it faces the other way

Which of the following inequalities is equivalent to $-2 < x < 4$?

(A) $|x-2| < 4$
(B) $|x-1| < 3$
(C) $|x+1| < 3$
(D) $|x+2| < 4$
(E) None of the above

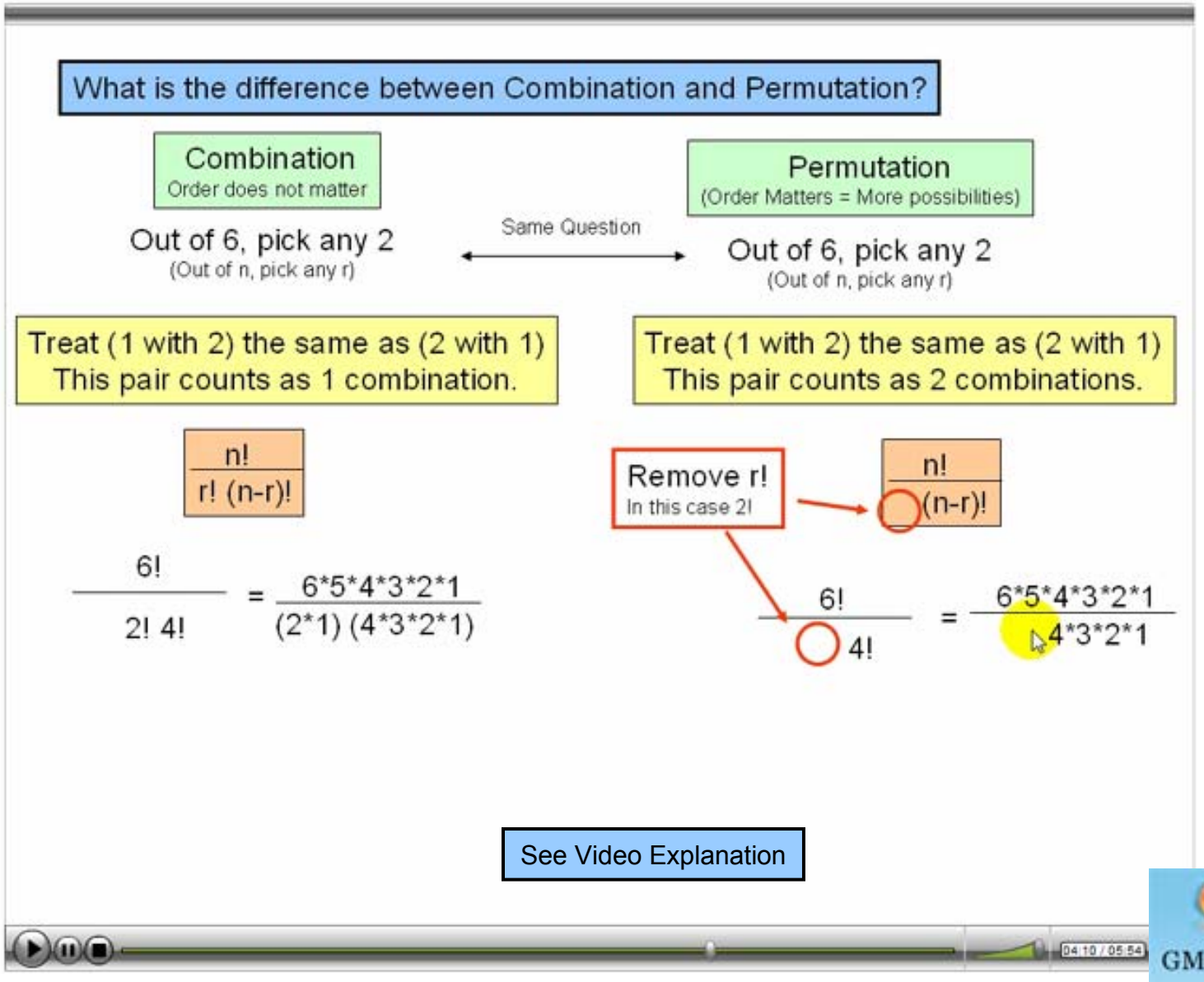
A)	$x<4+2$ $x<6$	$x> -2$
B)	$x-1<3$ $x<4$	$x> -3+1$ $x> -2$
	Same as: $-2<x<4$	

See Video Explanation

Divisibility

Divisor	Divisibility Condition	Examples
1	Automatic.	Any integer is divisible by 1.
2	The last digit is even (0, 2, 4, 6, or 8).	1,294: 4 is even.
3	The sum of the digits is divisible by 3. For large numbers, digits may be summed iteratively.	405 => 4+0+5=9 and 636 => 6+3+6=15 which both are clearly divisible by 3. 16,499,205,854,376 => 1+6+4+9+9+2+0+5+8+5+4+3+7+6 sums to 69 => 6 + 9 = 15 => 1 + 5 = 6, which is clearly divisible by 3.
4	The last two digits divisible by 4.	54632: 32 is divisible by 4.
5	The last digit is 0 or 5.	495: the last digit is 5.
6	It is divisible by 2 and by 3.	1,458: 1 + 4 + 5 + 8 = 18, so it is divisible by 3 and the last digit is even, hence the number is divisible 6.

See Video Explanation


What is the difference between Combination and Permutation?
Combination
Order does not matter
Permutation
(Order Matters = More possibilities)
Out of 6, pick any 2
(Out of n, pick any r)
Same Question
Out of 6, pick any 2
(Out of n, pick any r)
Treat (1 with 2) the same as (2 with 1)
This pair counts as 1 combination.
Treat (1 with 2) the same as (2 with 1)
This pair counts as 2 combinations.
n!
r! (n-r)!
Remove r!
In this case 2!
n!
(n-r)!
6!
2! 4!
= 6*5*4*3*2*1
(2*1) (4*3*2*1)
6!
4!
= 6*5*4*3*2*1
4*3*2*1
See Video Explanation
04:10 / 05:54
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Nested GMAT Combination Problems

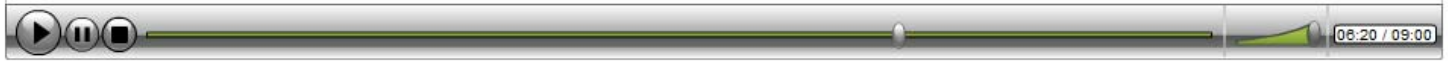
A group of 10 people consists of 3 married couples and 4 single men.
A committee of 4 is to be formed from the 10 people.
How many different committees can be formed if
the committee can consist of at most 1 married couple?

First, look at combinations of GROUPS—then look at individuals later.
Groups:
1. all four are singles
2. two are single and the other two are a married couple
3. ~~all four are made of 2 married couples~~

Now calculate the INDIVIDUAL combinations by using formula: $\frac{n!}{r!\,(n-r)!}$

1. nCr = 4C4 because out of 4 singles, choose 4 singles
   (4!) / (4!) = 1
2. Out of 4 singles, choose 2 singles. Then out of 3 couples, choose 1 couple.

   (4!) / (2! * 2!) = 4! / 4 = 3*2*1 = 6
3. Out of 3 couples, choose 2 couples.



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