

OAR MATH PRACTICE GUIDE

By Carlos Miro® - May-2016

Disclaimer: This study guide is a compilation of exercises of the Aviation Selection Test Battery (ASTB) and the Air Force Officer Qualification Test (AFOQT) from various books. These tests are proved to offer a highly complexity of exercises. This manual is distributed by topics for better accessibility. It should not be used as a solemnly study source and is highly recommendable to print it out and discuss this guide within a study group. Each exercise is written exactly how appears in their respectable book, please consult directly the original source for any doubt. Success!

Ratio-Proportion:

- 1- A 6 foot-tall farmer wants to determine the height of his barn. He notices that his shadow is 10 feet long and his barn casts a shadow 75 feet long. How high is the barn?
 - a. 30 feet
 - b. 35 feet
 - c. 40 feet
 - d. 45 feet

- 2- On a six-sided dice, each side has a number between 1 and 6. What is the probability of throwing a 3 or 4 ?
 - a. 1 in 6
 - b. 1 in 3
 - c. 1 in 2
 - d. 1 in 4

- 3- A crate containing a tool weighs 12 pounds. If the tool weighs 9 pounds, 9 ounces, how much does the crate weigh?
 - a. 2 pounds, 7 ounces
 - b. 2 pounds, 9 ounces
 - c. 3 pounds, 3 ounces
 - d. 3 pounds, 7 ounces
 - e. 3 pounds, 9 ounces

- 4- Assume that it takes an average of 3 man-hours to stack 1 ton of a particular item. In order to stack 36 tons in 6 hours, the number of persons required is
 - a. 9
 - b. 12
 - c. 15
 - d. 18
 - e. 21

- 5- Two office workers have been assigned to address 750 envelopes. One addresses twice as many envelopes per hour as the other. If it takes five hours for them to complete the job, what was the rate of the slower worker ?
- 50 envelopes per hour
 - 75 envelopes per hour
 - 100 envelopes per hour
 - 124 envelopes per hour
 - 150 envelopes per hour
- 6- If there are red, green, and yellow marbles in a jar and 20% of these marbles are either red or green, what are the chances of blindly picking a yellow marble out of the jar?
- 1 out of 3
 - 1 out of 5
 - 2 out of 3
 - 2 out of 5
 - 4 out of 5
- 7- Each corridor contains 8 to 10 classrooms and each classroom contains 20 to 24 students. If all classrooms are occupied, what is the minimum number of students on one corridor at a given time?
- 160
 - 170
 - 180
 - 190
- 8- A team won 25 games in a 40-game season. Find the ratio of games won to games lost.
- 3:5
 - 5:3
 - 3:8
 - 8:3
- 9- One recruit can complete a certain assignment in 40 minutes; another recruit can complete the same assignment in one hour. How long would it take to complete the assignment if the two recruits worked together?
- 12 minutes
 - 18 minutes
 - 24 minutes
 - 30 minutes

- 10- A naval detachment has enough rations to feed sixteen people for 10 days. If four more people join the detachment, for how many fewer days will the rations last?
- 1
 - 2
 - 3
 - 4
- 11- A field can be plowed by 9 machines in 5 hours. If 3 machines are broken and cannot be used, how many hours will it take to plow the field?
- 7 $\frac{1}{2}$ hours
 - 8 $\frac{1}{2}$ hours
 - 9 $\frac{1}{2}$ hours
 - 10 $\frac{1}{2}$ hours
- 12- In a 3-hour examination of 320 questions, there are 40 mathematics problems. If twice as much time should be allowed for each mathematics problem as for each of the other questions, how many minutes should be spent on the mathematics problems?
- 40 minutes
 - 45 minutes
 - 50 minutes
 - 55 minutes
- 13- Nicholas receives a basic weekly salary of \$180 plus a 5% commission. In a week in which his sales amounted to \$1800, the ratio of his basic salary to his commission was
- 3:1
 - 2:1
 - 3:2
 - 1:1
 - 1:2
- 14- The ratio of Democrats to Republicans in a certain state legislature is 5:7. If the legislature has 156 members, all of whom are either Democrats or Republicans (but not both), what is the difference between the number of Republicans and the number of Democrats?
- 14
 - 26
 - 35
 - 37
 - 46

15- A pole 24 feet high has a shadow 8 feet long. A nearby is 72 feet high. How long is its shadow?

- a. 16 feet
- b. 24 feet
- c. 32 feet
- d. 40 feet
- e. 56 feet

16- If 15 cans of food are needed for 7 adults for 2 days, the number of cans needed for 4 adults for 7 days is

- a. 15
- b. 20
- c. 25
- d. 30
- e. 35

17- One printing press can do a job in 8 hours. Another printing press can do the same job in 12 hours. How long would it take both presses, working together, to do the job?

- a. 4 hours 12 minutes
- b. 4 hours 24 minutes
- c. 4 hours 36 minutes
- d. 4 hours 48 minutes
- e. 5 hours

18- Harvey paid \$400 for a used car that travels 28 miles per gallon on the highway and 20 miles per gallon in the city. If he drove twice as many while using 34 gallons of gasoline, how many miles did he drive altogether?

- a. 1,000
- b. 840
- c. 400
- d. 340
- e. 280

Percents:

19- Successive discounts of 20% and 15% are equivalent to a single discount of

- a. 32%
- b. 33%
- c. 34%
- d. 35%

20- In order to check on a shipment of 500 articles, a sampling of 50 articles was carefully inspected. Of the sample, 4 articles were found to be defective. On this basis, what is the probable percentage of defective articles in the original shipment?

- a. 8%
- b. 4%
- c. .8%
- d. .4%
- e. .04%

21- The price of a one-hundred-dollar item after successive discounts of 10% and 15% is

- a. \$75.00
- b. \$75.50
- c. \$76.00
- d. \$76.50
- e. \$77.00

22- A certain governmental agency had a budget last year of \$1,100,500. Its budget this year was 7% higher than that of last year. The budget for next year is 8% higher than this year's budget. Which one of the following is the agency's budget for next year?

- a. \$1,117,600
- b. \$1,161,600
- c. \$1,261,700
- d. \$1,265,600
- e. \$1,271,700

23- A Navy recruiting station enlisted 560 people. Of these, 25% were under 20 years old and 35% were 20 to 22 years old. How many of the recruits were over 22 years old?

- a. 196
- b. 224
- c. 244
- d. 280
- e. 336

24- What is 10% of 40%?

- a. 4%
- b. 30%
- c. 50%

d. 400%

25- If the tax rate is $3\frac{1}{2}\%$ and the amount to be raised is \$6440, what is the base?

- a. \$180,000
- b. \$181,000
- c. \$182,000
- d. \$184,000

26- How much pure acid must be added to 12 ounces of a 40% acid solution in order to produce a 60% acid solution?

- a. 5 ounces
- b. 6 ounces
- c. 7 ounces
- d. 8 ounces

27- Maximum engine life is 900 hours. Recently, 27 engines were removed with an average life of 635.30 hours. What percent of the maximum engine life has been achieved?

- a. 71%
- b. 72%
- c. 73%
- d. 74%
- e. 75%

Roots and Exponents:

28- The square root of 250 is between

- a. 15 and 16
- b. 14 and 15
- c. 13 and 14
- d. 12 and 13
- e. 11 and 12

29- $5\sqrt{12} - 2\sqrt{27} =$

- a. $3\sqrt{4}$
- b. $3\sqrt{4}$
- c. $4\sqrt{3}$
- d. $5\sqrt{2}$

e. $5\sqrt{3}$

30- What is the square root of 16 raised to the fourth power?

- a. 16
- b. 64
- c. 128
- d. 256

31- What is the square root of 9 raised to the fourth power?

- a. 12
- b. 27
- c. 49
- d. 81

32- $10^3 \times 10^5 =$

- a. 10^2
- b. 10^8
- c. 10^{15}
- d. 10^{35}
- e. None of the above

33- 3.47×10^{-2} is equal to

- a. 347
- b. 34.7
- c. 3.47
- d. 0.347
- e. 0.0347

34- 100,000 may be represented as

- a. 10^4
- b. 10^5
- c. 10^6
- d. 10^7

35- The logarithm to the base 10 of 1,000 is

- a. 1
- b. 1.6
- c. 2
- d. 2.7
- e. 3

36- 10^x divided by 10^y equals

- a. $10^{x/y}$
- b. 10^{xy}
- c. 10^{x+y}
- d. 10^{x-y}
- e. none of these

37- $(-3)^3$

- a. 9
- b. -9
- c. 27
- d. -27

38- One million may be represented as

- a. 10^4
- b. 10^5
- c. 10^6
- d. 10^7
- e. 10^8

39- $3^n=9$, what is the value of 4^{n+1} ?

- a. 24
- b. 48
- c. 64
- d. 108
- e. none of these

40- 10^{-2} is equal to

- a. 0.001

- b. 0.01
- c. 0.1
- d. 1.0
- e. 100.0

41- The expression, $\sqrt{28} - \sqrt{7}$ reduces to

- a. $\sqrt{4}$
- b. $\sqrt{7}$
- c. $3\sqrt{7}$
- d. $\sqrt{21}$
- e. $-\sqrt{35}$

Geometry:

42- Which of the following are complementary angles?

- a. 71° and 90°
- b. 90° and 90°
- c. 90° and 45°
- d. 15° and 30°

43- If the measures of three angles in a triangle are 2:6:10, what is the measure of the smallest angle?

- a. 20 degrees
- b. 40 degrees
- c. 60 degrees
- d. 80 degrees

44- If a circle has a diameter of 12cm, what is its area?

- a. 38cm^2
- b. 113cm^2
- c. 276cm^2
- d. 452cm^2

45- The length of a square is 15cm. What is its area?

- a. 30cm^2
- b. 60cm^2
- c. 150cm^2
- d. 225cm^2

46- A rectangular solid measures 12cm by 3cm by 9cm. What is its volume?

- a. 36cm^2
- b. 108cm^2
- c. 324cm^2

- d. 407cm^2
- 47- The perimeter of a square is 24m. What is its area?
- a. 30m^2
 - b. 36m^2
 - c. 42m^2
 - d. 24m^2
- 48- If a rectangle has a length of 5cm and a width of 7cm, what is its area?
- a. 24cm^2
 - b. 35cm^2
 - c. 42cm^2
 - d. 56cm^2
- 49- If the volume of a cube is 8cm^3 , what is the length of the cube?
- a. 1cm
 - b. 2cm
 - c. 3cm
 - d. 4cm
- 50- A room 27 feet by 32 feet is to be carpeted wall to wall. The width of the carpet is 27 inches. The length, in yards, of the carpet needed for this room is
- a. 128
 - b. 256
 - c. 384
 - d. 648
 - e. 1188
- 51- A rectangular flower bed whose dimensions are 16 yards by 12 yards is surrounded by a walk 3 yards wide. The area of the walk is
- a. 93 square yards
 - b. 96 square yards
 - c. 144 square yards
 - d. 204 square yards
 - e. 244 square yards
- 52- If the sum of the edges of a cube is 48 inches, the volume of the cube is
- a. 4 cubic inches
 - b. 8 cubic inches
 - c. 16 cubic inches
 - d. 64 cubic inches

53- The hour hand of a clock is 3 feet long. How many feet does the tip of this hand move between 1:00pm and 5:00pm?

- a. 2π
- b. 4π
- c. 6π
- d. 8π

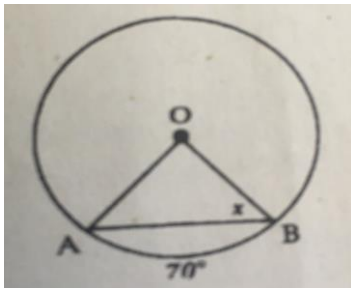
54- Find the area of a square circumscribed about a circle whose radius is 10.

- a. $31\frac{3}{7}$
- b. $62\frac{6}{7}$
- c. 100
- d. 400

55- If a triangle of base 6 has the same area as a circle of radius 6, what is the altitude of the triangle?

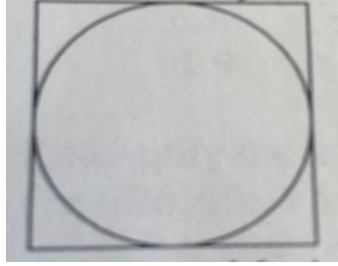
- a. 6π
- b. 8π
- c. 10π
- d. 12π

56- In the figure below, what is the measure of angle x?



- a. 35°
- b. 45°
- c. 55°
- d. 70°

57- Suppose the area of the square in the diagram to the right is 64 in^2 . (The square is not shown actual size.) What is the area of the circle?



- a. $16\pi \text{ in}^2$
 - b. $64\pi \text{ in}^2$
 - c. $\frac{64}{\pi} \text{ in}^2$
 - d. $(64+\pi)\text{in}^2$
- 58- The floor area in a Navy warehouse measures 200 feet by 200. What is the maximum safe floor load if the maximum weight the floor area can hold is 4000 tons?
- a. 100 pounds per square foot
 - b. 120 pounds per square foot
 - c. 140 pounds per square foot
 - d. 160 pounds per square foot
 - e. 200 pounds per square foot
- 59- A room measuring 15 feet wide, 25 feet long, and 12 feet high is scheduled to be painted shortly. If there are two windows in the room, each 7 feet by 5 feet, and a glass door, 6 feet by 4 feet, then the area of wall space to be painted measures
- a. 842 square feet
 - b. 866 square feet
 - c. 901 square feet
 - d. 925 square feet
 - e. 4,406 square feet
- 60- The length of a rectangle is 4 times the width. If the area of the rectangle is 324 square feet, the dimensions of the rectangle are
- a. 8' x 32'
 - b. 8' x 42'
 - c. 9' x 36'
 - d. 9' x 40'
 - e. 9' x 46'
- 61- On a scaled drawing of an office building floor, $\frac{1}{2}$ inch represents three feet of actual floor dimension. A floor which is actually 75 feet wide and 132 feet long would have which of the following dimensions on the scaled drawing?
- a. 12.5 inches wide and 22 inches long
 - b. 17 inches wide and 32 inches long
 - c. 25 inches wide and 44 inches long
 - d. 29.5 inches wide and 52 inches long
 - e. none of these

- 62- If the weight of water is 62.4 pounds per cubic foot, the weight of the water that fills a rectangular container 6 inches by 6 inches by 1 foot is:
- 3.9 pounds
 - 7.8 pounds
 - 15.6 pounds
 - 31.2 pounds
 - 62.4 pounds
- 63- The area of a square is 36 square inches. If the side of this square is doubled, the area of the new square will be:
- 72 square inches
 - 108 square inches
 - 216 square inches
 - 244 square inches
 - none of these
- 64- How many meters will a point on the rim of a wheel travel if the wheel makes 35 rotations and its radius is one meter?
- 110
 - 120
 - 210
 - 220
 - 240
- 65- The hypotenuse of a right triangle whose legs are 5" and 12" is
- 7"
 - 13"
 - 14"
 - 17"
 - none of these
- 66- The sum of the angle measures of a pentagon is
- 360°
 - 540°
 - 720°
 - 900°
 - 1180°

67- The volume of a cylinder with a radius of r and a height of h is

- a. πrh
- b. $2\pi rh$
- c. $2\pi r^2h$
- d. $4\pi r^2h$
- e. none of these

68- Which of the following lengths of a side of an equilateral triangle has a perimeter divisible by both 3 and 5?

- a. 3
- b. 4
- c. 5
- d. 6
- e. 7

Fractions:

69- A pound of margarine contains four equal sticks of margarine. The wrapper of each stick has markings which indicate how to divide the stick into eight sections, each section measuring one tablespoon. If a recipe calls for four tablespoons of margarine, the amount to use is

- a. $\frac{1}{16}$ lb
- b. $\frac{1}{8}$ lb
- c. $\frac{1}{4}$ lb
- d. $\frac{1}{2}$ lb
- e. $\frac{3}{4}$ lb

70- When 550 gallons of oil are added to an oil tank that is $\frac{1}{8}$ full, the tank becomes $\frac{1}{2}$ full. The capacity of the oil tank is most nearly

- a. 1,350 gals
- b. 1,390 gals
- c. 1,430 gals
- d. 1,470 gals
- e. 1,510 gals

71- $(\frac{2}{5})^2$ equals

- a. $\frac{4}{5}$
- b. $\frac{2}{10}$
- c. $\frac{4}{10}$
- d. $\frac{2}{25}$
- e. $\frac{4}{25}$

- 72- A scale of $\frac{1}{24,000}$ is the same as a scale of
- a. $1/32$ inch \cong 1 yard
 - b. 1 inch \cong 2,000 feet
 - c. 1 foot \cong $\frac{1}{2}$ mile
 - d. 1 yard \cong 2 miles
 - e. none of these
- 73- The numerical value of $4!/3!$ is
- a. .75
 - b. 1
 - c. 1.25
 - d. 1.33
 - e. 4
- 74- A family drove from New York to San Francisco, a distance of 3,000 miles. They drove $\frac{1}{10}$ of the distance the first day and $\frac{1}{9}$ of the remaining distance the second day. How many miles were left to be driven?
- a. 2,200 miles
 - b. 2,300 miles
 - c. 2,400 miles
 - d. 2,500 miles
- 75- Mrs. Norton spent $\frac{2}{3}$ of the family income one year and divided the remainder among 4 different savings accounts. If she puts \$2000 into each account, what was the amount of her family income that year?
- a. \$8000
 - b. \$16,000
 - c. \$24,000
 - d. \$32,000
 - e. \$40,000
- 76- What part of a dime is a quarter?
- a. $\frac{5}{2}$
 - b. $\frac{3}{2}$
 - c. $\frac{2}{5}$
 - d. $\frac{2}{3}$
 - e. $\frac{3}{4}$

77- Eight hundreds persons are employed by the Metropolitan Transit Authority. One quarter of the employees are college graduates; $\frac{5}{6}$ of the remainder are high school graduates. What part of the total number of employees never graduated from high school?

- a. $\frac{1}{8}$
- b. $\frac{1}{6}$
- c. $\frac{1}{4}$
- d. $\frac{5}{6}$
- e. $\frac{7}{8}$

78- The two children weighing 60 pounds and 80 pounds, respectively, balance a seesaw. How many feet from the fulcrum must the heavier child sit if the lighter child is 8 feet from the fulcrum?

- a. $4\frac{1}{2}$
- b. 6
- c. $7\frac{1}{2}$
- d. 9
- e. $10\frac{1}{2}$

79- A pole 63 feet long was broken into two unequal parts so that $\frac{3}{5}$ of the longer piece equaled $\frac{3}{4}$ of the shorter piece. Find the length of the longer piece.

- a. 33 feet
- b. $33\frac{1}{2}$
- c. 34 feet
- d. $34\frac{1}{2}$
- e. 35

80- A purse contains \$2.20 in dimes and quarters. If the number of dimes is $\frac{1}{4}$ the number of quarters, how many dimes are there?

- a. 2
- b. 4
- c. 6
- d. 8
- e. 10

81- The numerical value of $\frac{5!}{3!}$ is

- a. 1.67
- b. 2
- c. 1.5
- d. 20
- e. none of these

82- If "a" is greater than 2, which of the following is the smallest?

- a. $\frac{2}{a}$

- b. $\frac{a}{2}$
- c. $\frac{2}{a-1}$
- d. $\frac{a+1}{2}$
- e. $\frac{2}{a+1}$

83- Which of the following has the greatest value?

- a. $\frac{3}{5}$
- b. $\left(\frac{2}{3}\right)\left(\frac{3}{4}\right)$
- c. $\sqrt{25}$
- d. $(0.9)^2$
- e. $2/0.3$

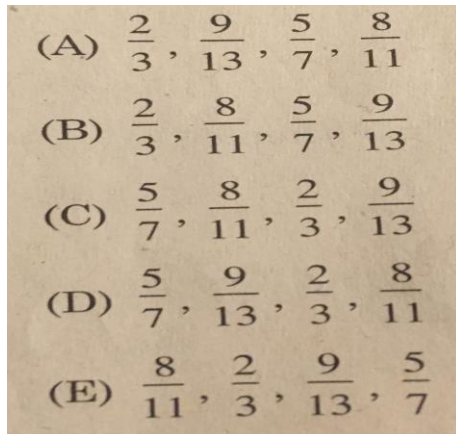
84- The Spencers took “t” dollars in traveler’s checks with them on a trip. During the first week, they spent $\frac{1}{5}$ of their money. During the second week, they spent $\frac{1}{3}$ of the remainder. How much did they have left at the end of the second week?

- a. $t/15$
- b. $4t/15$
- c. $7t/15$
- d. $8t/15$
- e. $11t/15$

85- If “r” planes carry “p” passengers, how many planes are needed to carry “m” passengers?

- a. $\frac{m}{rp}$
- b. $\frac{p}{rm}$
- c. $\frac{rm}{p}$
- d. $\frac{rp}{m}$
- e. $\frac{pm}{r}$

86- When the fractions $\frac{2}{3}$, $\frac{5}{7}$, $\frac{8}{11}$, and $\frac{9}{13}$ are arranged in ascending order of size, the result is



Equations:

87- If $16x+4=100$, what is the value of x ?

- a. 6
- b. 7
- c. 8
- d. 9

88- Simplify the following expression: $(2x-20)(5x+10)$

- a. $10x^2-80x-200$
- b. $70x-200$
- c. $10x^2-80x+200$
- d. $10x^2-120x-200$

89- Simply the following expression: $(2x^4)^3+2(y^5)^5$

- a. $8x^{64}+2y^{3125}$
- b. $6x^7+2y^{10}$
- c. $6x^{12}+2y^{25}$
- d. $8x^{12}+2y^{25}$

90- If $2x^2=-4x^2+216$, what is the value of x ?

- a. 4
- b. 5
- c. 6
- d. 7

91- Solve for "y" in the following inequality: $-2y \geq 24+6$

- a. $y < 15$
- b. $y \geq 15$
- c. $y \leq -15$
- d. $y \geq -15$

92- If $2x=5x-30$, what is the value of x ?

- a. 10
- b. -10
- c. 4.3
- d. -4.3

93- Given the functions, $f(x) = 3x+6$ and $g(x) = 2x-8$, what is the solution of the equation, $f(x)=g(x)$?

- a. $x = -12$
- b. $x = -8$
- c. $x = -14$
- d. $x = -10$

94- Solve for x in the following inequality: $4x+23 > -3x-6$

- a. $x > -4.14$
- b. $x < -4.14$
- c. $x > 4.14$
- d. $x < 4.14$

95- If $2x+5x=3x+x+30$, what is the value of x ?

- a. 2.72
- b. 4.29
- c. 6
- d. 10

96- $3x^2y+y/2-6x$

If $x=4$ and $y=10$, what is the value of the expression

- a. 221
- b. 461
- c. 872
- d. 1916

97- If $w=7$, calculate the value of the following expression: $8w^2-12w+(4w-5)+6$

- a. 279
- b. 285
- c. 337
- d. 505

98- If $x/3+7=35$, what is the value of x ?

- a. 9.33
- b. 14
- c. 84

d. 126

99- In the following equation, solve for x by factoring: $2x^2-7x=x^2-12$

- a. 9.33
- b. 14
- c. 84
- d. 126

100- Simply the following expression: $(2x^2+3)(2x-1)$

- a. $4x^3-2x^2+6x-3$
- b. $2x^2+6x-3$
- c. $4x^3-2x^2+6x+3$
- d. $4x^3-2x^2-6x-3$

101- Simply the following expression: $(2x^4y^7m^2z)*(5x^2y^3m^8)$

- a. $10x^6y^9m^{10}z$
- b. $7x^6y^{10}m^{10}z$
- c. $10x^5y^{10}m^{10}z$
- d. $10x^6y^{10}m^{10}z$

102- If x varies directly as y^2 and if $x=9$ when $y=2$, what is the value of "x" when $y=8$?

- a. 32
- b. 130
- c. 144
- d. 168

103- Find the second of three consecutive integers if the sum of the first and third is 26.

- a. 9
- b. 10
- c. 11
- d. 13

104- If the entrance requirement of a certain college is 82, what mark must a student have in Geometry (weight 2) to be able to enter if his other marks are English 88 (weight 3); Spanish 78 (weight 2), and History 80 (weight 2)?

- a. 83
- b. 82
- c. 81
- d. 79

105- If $(x-y)^2=40$ and $x^2+y^2=60$, then $xy=$

- a. 40
- b. 20
- c. 12
- d. 10

106- If $2^{n-2}=32$, then “n” equals

- a. 5
- b. 7
- c. 8
- d. 12

107- If $a=3b$ and $6b=12c$, then $a=$

- a. $6c$
- b. $9c$
- c. $12c$
- d. $15c$

Conversions:

108- Two trains are 630 miles apart. At 9:00am, they start traveling toward each other at average rates of 50 and 55mph, respectively. At what time will they pass each other?

- a. 1:00pm
- b. 1:30pm
- c. 2:00pm
- d. 2:30pm
- e. 3:00pm

109- At 12:00 noon, two vessels started sailing towards each other from ports that are 450 miles apart. They traveled at average rates of 22 and 28mph, respectively. How many miles apart will the vessels be at 8pm?

- a. 125
- b. 100
- c. 75
- d. 50
- e. 25

110- Two planes left at the same time from two airports that are 6000 miles apart and flew toward each other. They passed each other in five hours. The rate of the fast plane was twice the rate of the slow plane. What was the speed of the fast plane?

- a. 400mph
- b. 500mph
- c. 600mph
- d. 700mph
- e. 800mph

- 111- Harvey paid \$400 for a used car that travels 28 miles per gallon on the highway and 20 miles per gallon in the city. If he drove twice as many highway miles as a city miles last month while using 34 gallons of gasoline. How many miles did he drive altogether?
- 1,000
 - 840
 - 400
 - 340
 - 280
- 112- There are 20 cigarettes in one pack and 10 packs of cigarettes in a carton. A certain brand of cigarettes contain 12 mg tar per cigarette. How many grams of tar are contained in one carton of these cigarettes? (1 gram=1000 miligram)
- .024 grams
 - .24 grams
 - 2.4 grams
 - 24 grams
 - 240 grams
- 113- If an aircraft is traveling at 630 miles per hour. How many miles does it cover in 1200 seconds?
- 180 miles
 - 210 miles
 - 240 miles
 - 280 miles
 - 310 miles
- 114- It takes a runner 9 seconds to run a distance of 132 feet. What is the runner's speed in miles per hour? (5280 ft=1 mile)
- 5
 - 10
 - 12
 - 15
 - 16

Answers:

- 1- D: $6:10 = x:75$; $10x=450$; $x=45$ feet.
- 2- B: On a six side dice the probability of throwing any number is 1 in 6. The probability of throwing a 3 or 4 is double that, or 2 in 6. This can be simplified by dividing both 2 and 6 by 2. Therefore, the probability of throwing either a 3 or 4 is 1 in 3.
- 3- A: 12 pounds=11pounds,16 ounces; weigh of tool=9 pounds, 9 ounces. 11 pounds, 16 ounces minus 9 pounds, 9 ounces=2 pounds, 7 ounces.

- 4- D: $36 \text{ tons} \times 3 \text{ man-hours} = 108 \text{ man-hours}$ to stack 36 tons. $108/6 = 18$ persons needed to complete stacking in 6 hours.
- 5- A: Let x = number of envelopes addressed in 1 hour by slower worker. $2x$ = number of envelopes addressed in 1 hour by faster worker. $3x(5) = 750$; $15x = 750$; $x = 50$ envelopes per hour for slower worker.
- 6- E: If 20% are either red or green, 80% are yellow. The chance of blindly picking a yellow marble is 4 out of 5 (80%).
- 7- A: There is a minimum of 20 students in a minimum of 8 classrooms; $8 \times 20 = 160$.
- 8- B: 25 games won: 15 games lost: $25/15 = 5/3$.
- 9- C: Time actually needed/Time needed to do job alone
- | | |
|-----------|----------------|
| Recruit 1 | Recruit 2 |
| $x/40$ | $+ \quad x/60$ |
| $= 1$ | |
- Multiply by 120 to clear fractions. $3x + 2x = 120$; $5x = 120$
 $X = 120/5 = 24$ minutes.
- 10- B: Let x = number ration days for 20 persons. $16 \times 10 = 20(x)$; $20x = 160$; $x = 160/20 = 8$ ration days for 20 persons. $10 \text{ days} - 8 \text{ days} = 2$ days fewer.
- 11- A: Let x = number of hours to plow with 6 machines.
 $9x5 = 6(x)$
 $6x = 45$; $x = 45/6 = 7 \frac{1}{2}$ hours
- 12- A: Let x = minutes to be spent on each math problem, $x(40) + x/2 (280) = 180$; $40x + 140x = 180$;
 $180x = 180$; $x = 1$; $40x = 40$ minutes to be spent on the 40 math problems.
- 13- B: $\$1800 \times 0.05 = \90.00 ; $180/90 = 2/1$.
- 14- B: Let the number of Democrats be $5m$ and the number of Republicans be $7m$, so that D:R : $5m:7m = 5:7$. The total is $5m + 7m = 12m$, which must be 156. Therefore, $12m = 156$, and $m = 13$. Of course, the difference is $7m - 5m = 2m = 2(13) = 26$. Hence the answer is choice B.
- 15- B: $24:8 = 72 : x$; $3:1 = 72 : x$; $x = 72/3 = 24$ feet
- 16- D: $15:14 = x:28$; $x = 28(15)/14 = 30$
- 17- D: First Press
Time actually needed/Time needed to do job alone
- | |
|------------------|
| Second Press |
| $x/8 + x/12 = 1$ |
- Multiply by 24 to clear fractions.
 $3x + 2x = 24$; $5x = 24$; $x = 24/5 = 4 \frac{4}{5}$ hours or 4 hours 48 minutes.
- 18- B: Let x be the number of city miles Harvey drove, and let $2x$ be the number of highway miles. Miles divided by miles per gallon should give the number of gallons of gas used. Thus:
- | | |
|---------------------|--|
| $x/20 = 2x/28 = 34$ | Multiply the equation by the LCD 140 to get: |
| | $7x + 10x = 4760$ |
| $x/20 = x/14 = 34$ | |
| | $17x = 4760$; $x = 280$ |

Since Harvey drove a total of $3x$ miles, the correct answer is $3(280)=840$.

19- A: $100 \times .20=20$; $100-20=80$; $80 \times 1.15=12$; $80-12=68$; $100-68=32$.

20- A: Sample size is 50. Number of defects found in sample $=4.4/50=8\%$. If 8% defects were found in the sample, it is probable that the percentage of defective articles in the original shipment is also 8%.

21- D: $\$100 \times .10 = \10.00 ; $\$100 - \$10 = \$90$. $\$90 \times .15 = \13.50 ; $\$90.00 - 13.50 = \76.50 .

22- E: $\$1,100,500 \times .07 = \$77,035$; $\$1,100,500 + \$77,035 = \$1,177,535 =$ this year's budget. $\$1,177,53 \times .08 = \$94,203$; $\$1,177,535 + \$94,203 = \$1,271,738$ which is closest to Option (E).

23- B: $25\% + 35\% = 60\%$. 60% were 22 years old or under 22 years of age. 40% were over 22 years old. $560 \times .40 = 224$.

24- A: x percent is the same thing as $x/100$, and finding x percent of a number is the same as multiplying that number by x percent. This is true even when the number is itself a percent. So, 10% of 40% is $40\% \times 10\% = 40\% \times 1/10 = 4\%$.

25- D: Let $x =$ base $x(.035) = 6440$; $x = 6440/.035 = \$184,000$.

26-

	# of Ounces	Parts Pure Acid	# of Ounces of Pure Acid
Pure Acid	x	100	$100x$
40% Acid Solution	12	40	480
60% Acid Solution	$12+x$	60	$60(12+x)$

$$100x + 480 = 60(12 + x); 100x + 480 = 720 + 60x; 40x = 240; x = 6.$$

27- A: $635.30/900 = 0.7058 = 71\%$.

28- A: $15^2 = 225$; $16^2 = 266$. 250 is between 225 and 266.

29- C: $5\sqrt{12} = 5\sqrt{4 \times 3} = 5 \times 2\sqrt{3} = 10\sqrt{3}$

$$2\sqrt{27} = 2\sqrt{9 \times 3} = 2 \times 3\sqrt{3} = 6\sqrt{3}$$

$$10\sqrt{3} - 6\sqrt{3} = 4\sqrt{3}$$

30- D: The square root of 16 $= 4$; $4^4 = 4 \times 4 \times 4 \times 4 = 16 \times 16 = 256$.

31- D: $\sqrt{9} = 3$; $3^4 = 3 \times 3 \times 3 \times 3 = 81$

32- B: When multiplying logarithms with the same base, add the exponents. $10^3 \times 10^5 = 10^8$.

33- E: Choices B and D are greater than 1; other choices have the same numerator; however, choice E has the greatest denominator and, therefore, the smallest value, a value of less than 1.

34- B: $10 \times 10 \times 10 \times 10 \times 10 = 100,000$ or 10 raised to the 5th power.

35- E: $10 \times 10 \times 10 = 1,000$. The logarithm is the exponent 3 to which the base 10 must be raised.

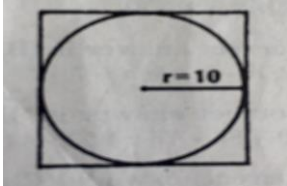
- 36- D: To divide powers of the same base, subtract the exponent of the denominator from the exponent of the numerator. 10^x divided by 10^{x-y} .
- 37- D: The odd integer power of a negative number is negative; the even integer power of a negative number is positive.
- 38- C: $1,000,000 = 10^6$
- 39- C: $3^n = 9$; $n=2$; $4^{n+1} = 4^3 = 64$.
- 40- B: $10^{-2} = \frac{1}{10^2} = \frac{1}{100} = 0.01$
- 41- B: $\sqrt{28} - \sqrt{7} = \sqrt{7 \times 4} - \sqrt{7} = 2\sqrt{7} - \sqrt{7} = \sqrt{7}$
- 42- A: Complementary angles are two angles that equal 90° when added together.
- 43- A: The sum of the measures of the three angles of any triangle is 180. The equation of the angles of this triangle can be written as $2x+6x+10x=180$, or $18x=180$. Therefore, $x=10$. Therefore, the measure of the smallest angle is 20.
- 44- B: The formula for the area of a circle is πr^2 . The diameter of a circle is equal to twice its radius. Therefore, to find the radius of this circle, it is necessary to divide the diameter by 2: $12/2=6\text{cm}$ then, use the formula to find the area of the circle: $\pi 6^2 \pi 36=113\text{cm}^2$
- 45- B: The general equation to find the area of a quadrilateral is length*width. Since the length and width of a square are equal, we can calculate the area of the square described in the question: $A=l*w$, $A=15\text{cm}*15\text{cm}$, $A=225\text{cm}^2$
- 46- C: To find the volume of a rectangular solid, the formula is length*width*height. Therefore, this solid's volume= $12\text{cm}*3\text{cm}*9\text{cm}=324\text{cm}^3$
- 47- B: The general equation to find the area of a quadrilateral is length*width. Since the length and width of a square are equal, we can calculate the area of the square described in the question. We can divide the perimeter by 4 since all sides are equal length. Once we know each side is 6m we can multiply $6*6$ to get an area of 36m^2 .
- 48- B: The formula for the area of a rectangle is length*width. Using the measurements given in the question, the area of the rectangle can be calculated: $A=\text{length}*\text{width}$, $A=5\text{cm}*7\text{cm}$, $A=35\text{cm}^2$
- 49- B: The volume of a cube is calculated by cubic length, width, or height of the cube (the value for all three of these is the same. Therefore, the volume of a cube equals=length³. In this case $8\text{cm}^3=x*x*x$, where x can be represent the length of the cube. To find the length, we must figure out which number cubed equals 8. The answer is 2cm: $2\text{cm}*2\text{cm}*2\text{cm}=8\text{cm}^3$
- 50- A: $27 \times 32=864$ square feet to be carpeted. Let x=number of linear feet of carpeting needed.
- $27 \text{ inches} = \frac{9}{4} \text{ feet}; \frac{9}{4} * x = 864$
- $x = 864 * \frac{4}{9} = 384 \text{ feet}; \frac{384}{3} = 128 \text{ yards.}$
- 51- D: Area of flower bed =16 yards by 12 yards =192 square yards; area of bed and walk = $(16+3+3)(12+3+3)=22 \times 18=396$ square yards; $396-192 =204$ square yards.

52- D: A cube has 12 edges.

$$\frac{48}{12} = 4; 4 \times 4 \times 4 = 64 \text{ cubic inches.}$$

53- A: The hour hand traces a circle radius of 3. The circumference of that circle $= 2\pi r = 2\pi(3) = 6\pi$. A 4-hour interval is one third of a 12-hour period or one third of a full circle. $\frac{1}{3}$ of $6\pi = 2\pi$.

54- D:



Diameter = 20 = side of square; Area of square = 20 x 20 = 400.

55- D: The area of the circle is $\pi(6)^2$, or 36π . In the triangle,

$$\frac{1}{2} (6)(h) = 36\pi$$

$$3h = 36\pi$$

$$h = 12\pi$$

56- C: Arc AB = 70° ; therefore AOB = 70° .

The two radii are equal.

$$\text{Angle } x = \frac{1}{2} (180^\circ - 70^\circ) = \frac{1}{2} (110^\circ) = 55^\circ.$$

57- A: The area of the square is equal to the square of the length of one side. If the area is 64in^2 , the side length must therefore be $\sqrt{64\text{in}^2} = 8\text{in}$. The circle is inscribed in the square, so the side of the length of the square is the same as the circle's diameter. If the circle's diameter is 8in, then the circle's radius must be half of that, or 4 in. The area of a circle is equal to $A = \pi r^2 = \pi(4\text{in})^2 = 16\pi\text{in}^2$.

58- E: 200 feet x 200 feet = 40,000 square feet of floor area; 4000 tons x 2000 = 8,000,000 pounds; 8,000,000/40,000 = 200 pounds.

59- B: 25 x 12 = 300 sq. ft. = area of long wall; 300 x 2 = 600 sq. ft. 15 x 12 = 180 sq. ft. = area of short wall; 180 x 2 = 360 sq. ft. 600 + 360 = 960 sq. ft. = total wall area. 7 x 5 = 35 sq. ft. area of window; 35 x 2 = 70 sq. ft. = area of windows. 6 x 4 = 24 sq. ft. = area of glass door. 70 + 24 = 94 sq. ft. = total glass area. 960 - 94 = 866 sq. ft. = total glass area. 960 - 94 = 866 sq. ft. of wall space to be painted.

60- C: Let x = width of rectangle; $4x$ = length of rectangle. $x * 4x = 36$ feet.

61- A: $\frac{1}{2}$ inch on scaled drawing = 3 feet of actual floor dimension. $\frac{75}{3} = 25 \frac{1}{2}$ inches = 12.5 inches; $132/3 = 44 \frac{1}{2}$ inches = 22 inches.

62- C: $\frac{1}{2} \times \frac{1}{2} \times 1 = \frac{1}{4}$ cu ft.; $\frac{1}{4}$ of 62.4 = 15.6 pounds.

63- E: The square root of 36 = 6. Each side of the square = 6". 6" x 2 = 12". 12" x 12" = 144 square inches.

64- D: If the radius of the wheel is one meter, its diameter is 2 meters. The circumference is $\pi \times$ diameter = $2 \times \frac{22}{7}$. The distance traveled is $35 \times 2 \times \frac{22}{7} = 70 \times \frac{22}{7} = 220$.

65- B: $H^2 = 5^2 + 12^2$; $H^2 = 25 + 144$; $H^2 = 169$; $H = \sqrt{169}$; $H = 13$ ".

66- B: A pentagon has 5 sides. (Number of sides-2) x 180 =sum of angles. $3 \times 180 =540^\circ$.

67- E: The base of the cylinder, πr^2 , times the height, h, =volume of the cylinder. $\pi r^2 h$ is not one of the answers listed in the first four options.

68- $5 \times 3 =15$ which is divisible by both 3 and 5; 9, 12, 18 and 21 are not divisible by 5.

69- B: Each stick of margarine =1/4 lb. Each stick contains of eight sections or tablespoons. Four sections or tablespoons = $\frac{1}{2}$ of $\frac{1}{4}$ lb. = $\frac{1}{8}$ lb.

70- D: Let x= the capacity of the tank. $\frac{1}{8}$ of x + 550 = $\frac{1}{2}$ of x.

$$550 = \frac{x}{2} - \frac{x}{8} = \frac{3x}{8}$$

$$71- E: \left(\frac{2}{5}\right)^2 = \frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$$

72- B: 1 inch \cong 2,000 feet; 1 inch \cong 2,000 x 12 inches \cong 24,000 inches. No other option, converted into common terms, shows a scale of $\frac{1}{24,000}$.

$$73- E: \frac{4 \times 3 \times 2 \times 1}{3 \times 2 \times 1} = 4.$$

74- C: $\frac{1}{10}$ of 3,000 =300; $3,300-300 =2,700$; $\frac{1}{9}$ of 2,700 =300; $2,700-300 =2,400$ miles still to be driven.

75- C: $\frac{1}{3}$ of family income, or \$8000, was saved; $\frac{1}{3}$ of x =8000; x=\$24,000.

$$76- A: \frac{25}{10} = \frac{5}{2}$$

77- A: $\frac{1}{4} \times 800=200$; $800-200=600$

$$\frac{5}{6} \times 600=500; 600-500=100 \text{ There are 100 non-high school graduates employed } \frac{100}{800} = \frac{1}{8}.$$

78- B: $60 \times 8=80 * x$; $80x=480$; $x=\frac{480}{80} =6$

79- E: Let x=length of longer piece; $63-x$ =length of shorter piece.

$\frac{3}{5}x = \frac{3}{4}(63-x)$; $\frac{3}{5}x = 189/4 - 3/4x$; $\frac{3}{5}x + 3/4x = 189/4$; $\frac{12}{20}x + \frac{15}{20}x = 189/4$;
 $\frac{27}{20}x = 189/4$; $x = 189/4 \times \frac{20}{27} = 35$ feet.

80- A: Let x=number of dimes. $0.10x + 0.25(4x)=2.20$; $0.10x + x=2.20$; $1.10x=2.20$;

$$x = \frac{2.20}{1.10} = 2.$$

81- D: The factorial of a natural number is the product of that number and all the natural numbers less than it.

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120 \quad \frac{120}{6} = 20$$

$$3! = 3 \times 2 \times 1 = 6$$

82- E: Choices B and D are greater than 1; other choices have the same numerator; however, choice E has the greatest denominator and, therefore, the smallest value, a value of less than 1.

83- E: A=0.60; B=0.50; C=0.5; D=0.81; E=6.67.

84- D: $\frac{1}{5} t$ spent the first week; $t-t/5$ is left; $\frac{1}{3}(t-t/5) = \frac{1}{3} (5t/5-t/5) = \frac{1}{3} \times 4/5t = \frac{4}{15}t$ spent the second week; $\frac{3}{15}t + \frac{4}{15}t = \frac{7}{15}t$ spent the first two weeks; $\frac{8}{15}t$ is left.

85- C: Let x = number of planes needed to carry “ m ” passengers.

$$r:p = x; m; px=rm; x= rm/p$$

86- A: $\frac{2}{3} = 0.67$; $\frac{5}{7} = 0.71$; $\frac{8}{11} = 0.73$; $\frac{9}{13} = 0.69$

87- A: First, subtract 4 from both sides to isolate x : $16x+4-4=100-4$
 $16x=96$

Then, divide both sides by 16 to solve for x :
 $16x/16=96/16$; $x=6$

88- A: Use FOIL method (first, outside, inside, last) to get rid of the brackets: $10x^2-80x-200$. Then, combine like terms to simplify the expression: $10x^2-80x-200$

89- D: To simplify this expression, the law of exponents that states that $(x^m)^n=x^{m*n}$ must be observed:
 $2^3x^{4*3}+2(y^{5*5})$
 $8x^{12}+2y^{25}$

90- C: First, add $4x^2+4x^2+216$
 $6x^2=216$ Then, divide both sides by 6: $x^2=36$

91- C: First, add the 24 and the 6: $-2y \geq 30$ Then, divide both sides by -2 to solve for y :
 $-2y/-2 \geq 30/-2$
 $y \geq -15$ Finally, when both sides are divided by a negative number, the direction of the sign must be $y \leq -15$

92- A: First, bring the $5x$ to the left side of the equation to make it easier to solve:
 $2x-5x=-30$
 $-3x=-30$ Then, divide both sides by -3 to solve for x : $-3x/-3=-30/-3$; $x=10$

93- C: The solution of $f(x)=g(x)$ can be determined by setting the two functions equal to one another. Thus, the following may be written $3x+6=2x-8$. Solving for x gives $x= -14$.

94-A: First, bring the $-3x$ to the left side of the equation and the 23 to the right side of the equation to make it easier to solve: $4x+3x > -6-23$; $7x > -29$; Then, divide both sides by 7 to solve for x : $7x/7 > -29/7$

95- D: First, bring all the terms containing x to the left side of the equation to make it easier to solve:
 $2x+5x-3x-x=30$
 $7x-4x=30$
 $3x=30$
Then, divide both sides by 3 to solve for x : $3x/3=30/3$; $x=10$

96- B: First, substitute the given values for “ x ” and “ y ” into the expression:
 $3(4)^2+10+10/2-6(4)$
Then, calculate the value of the expression: According to the order of operations, any multiplying and dividing must be done first: $3*16+10+5-24$; $48+10+5-24$; Then, any addition or subtraction should be completed: $48+10+5-24= 461$

97- C: First, substitute the given value of w (7) into the expression each time it appears. $8*7^2-12(7)+(4*7-5)+6$
According to the order of operations, any calculations inside of the brackets must be done first: $8*7^2-12(7)+(23)+6$
Finally, calculate the value of the expression: $8*49-84+23+6$; $392-84+23+6= 337$

98- C: First, subtract 7 from both sides to isolate x : $x/3+7-7=35-7$; $x/3=28$
Then, multiply both sides by three to solve for x : $x/3*3=28*3$; $x=84$

99- B: First, bring all terms to the left side of the equation to make it easier to solve: $2x^2-7x-x^2+12=0$
Combine like terms: $x^2-7x+12=0$ Then, factor the equation: $(x-4)(x-3)=0$ Finally, solve for x in both instances: $x-4=0$; $x=4$; $x-3=0$; $x=3$; $x=3,4$

100- A: Use the FOIL (first, outside, inside, last) to expand the expression: $4x^3-2x^2+6x-3$
There are no like terms, so the expression cannot be simplified any further.

101- D: To simplify this expression, the law of exponents that state that $x^m \cdot x^n = x^{m+n}$ must be observed.
 $10x^{4+2}y^{7+3}m^{2+8}z$. Therefore, $10x^6y^{10}m^{10}z$ is the simplified expression.

102- C: $9:4=x:64$; $4x=64 \times 9$; $x = \frac{64 \times 9}{4} = 144$.

103- D: Represent the integers as x, x+1, and x+2. $x+x+2=26$; $2x=26-2$; $2x=24$; $x=12$; therefore, $x+1=13$.

104- D: Eng $88 \times 3=264$; Span $78 \times 2=156$; Hist $80 \times 2=160$; Geom $x \times 2=2x$, $9=580+2x$
 $82 \times 9=738$ points needed, $580+2x=738$, $2x+738-580=158$
 $x = \frac{158}{2} = 79$

105- D: $(x-y)^2=x^2-2xy+y^2$
 $40=60-2xy$
 $2xy=20$; $xy=10$

106- B: $2^{n-2}=32$; $2^5=32$; $n-2=5$; $n=7$.

107- A: $a=3b$; $2a=6b=12c$; $2a=12c$; $a=6c$.

108- E: Let x=time. $50x+55x=630$; $105x=630$; $x = \frac{630}{105} = 6$ hours. Trains left at 9:00am. Six hours later, it would be 3:00pm.

109- D: Noon to 8pm=8 hours. Distance covered $= (22 \times 8) + (28 \times 8) = 176 + 224 = 400$ miles. Total distance=450 miles; $450-400= 50$ miles apart.

110- E: Let x=rate of slower plane; $2x=$ rate of the faster plane. $5x+10x=6000$; $15x=6000$; $x=400$; $2x=800$.

111- B: Let x be the number of city miles Harvey drove, and let 2x be the number of highway miles. Miles be divided by miles per gallon should give the number of gallons of gas used. Thus: $\frac{x}{20} = \frac{2x}{28} = 34$; $\frac{x}{20} = \frac{x}{14} = 34$

Multiply the equation by the LCD 140 to get: $7x+10x=4760$; $17x=4760$; $x=280$
Since Harvey drove a total of 3x miles, the correct answer is $3(280)=840$.

112- D: There are 200 cigarettes in a carton ($20 \times 10=200$). $12\text{mg} \times 200=2400\text{mg}$ of tar in 200 cigarettes.
 $2400\text{mg}=2.4$ grams.

113- C: Interval between 7:00am and 1:00pm is 6 hours or $\frac{1}{4}$ of a day. $\frac{1}{4}$ of 20 minutes=5 minutes.
Subtracting 5 minutes from watch reading of 1:00pm= 12:55pm.

114- B: $132 \text{ feet} = \frac{132}{5280} = \frac{1}{40}$ mile ; $9 \text{ seconds} = \frac{9}{3600} = \frac{1}{400}$ hour = $\frac{1}{40}$ mile in $\frac{1}{400}$ hour =
1 mile in $\frac{1}{10}$ hour = 10 miles in 1 hour =10mph.

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“When you want to succeed
as bad as you want to breath
you will be successful.”
-Eric Thomas

