1) In a bakery, a customer has the option of buying a coke along with the pizza. The cost of one pizza is 5.75$ and cost of a coke is 1.25$. Which of the following expressions represents the total cost, in dollars of p pizzas and c cokes?

A 5.75c + 1.25p

B 5.75c - 1.25p

C 5.75p + 1.25c

D 5.75p - 1.25c

Sol: cost of p pizzas is (5.75p)$ and cost of c cokes is (1.25c)$.
Total cost is (5.75p + 1.25c) $

---

2) 300 miles constitutes of ¼ inch on the map. According to this scale, if the distance between Mayville to Rome is approximately 4800 miles what is the distance in inches on the map?

A 3

B 4

C 4.25

D 5

Sol: 300 => ¼

4800 => (4800x1/4)/300= 4800/1200= 4 inches

$$R = 120 + 15n$$

3) The rate of subscription of a monthly sports magazine depends on the number of months n as shown in the equation above. If the total amount is 520$ then for how many months was the magazine subscribed?

A 13

B 14.75

C 15.5

D 16

Sol: 315= 120 +15n; 15n = 195; n = 13

Questions 4 and 5 refer to the following information.

The cost of a cake is directly proportional to the weight of the cake in kgs. 2.5 kgs cake cost 130$ during a Christmas sale.

4) How much does a 3.5kg cake cost in dollars during this Christmas sale?

A 156

B 165

C 182

D 190

Sol: 3.5 kgs cake cost = (3.5x130)/2.5 = 182$

---

5) 32% of the total cost goes in making the cake and the rest of the money earned is profit for the cake owner. What is the profit in dollars for selling 2.5kgs cake?

A 95

B 90

C 88.40

D 85

Sol: 2.5 kgs cost 130$. Profit earned is (1-.32)130 = 88.40 $

6) If 15 is subtracted from 4 times the number x, the result is 45.

What number results if 10 is subtracted from 2 times the number x?

A 15

B 20

C 25

D 30

Sol: $4x - 15 = 45$; $x = 60/4 = 15$;

$2 \times 15 - 10 = 30 - 10 = 20$

---

7) A parabola in the xy plane has 2 and -4 as the x-intercepts. Which of the following represents the equation of the parabola?

A $y = x^2 - 6x + 8$

B $y = x^2 + 6x + 8$

C $y = x^2 - 2x - 8$

D $y = x^2 + 2x - 8$

Sol: $y = (x-2)(x+4) = x^2 + 2x - 8$

---

8) A game consists of completing 10 tasks. A player starts with 200 points. If a player completes a task he is rewarded 10 points and if a player fails to complete a task he loses x points. A player completes 7 tasks and fails to complete the rest of the tasks and scores 255. What is the value of x?

A 8

B 7

C 6

D 5

Sol: $200 + 7(10) - 3x = 255$;

$270 - 3x = 255$; $3x = 270 - 255 = 15$;

$X = 15/3 = 5$

9) An apple farmer packages apples in cartons containing either 30 apples or 45 apples. let x be the number of cartons containing 30 apples and y be the number of cartons containing 45 apples. A shipping truck can carry up to either 50 cartons or a weight of 1200 pounds. Which of the following systems of inequalities represents this relationship?

A x+y ≤ 50

   30x+ 45y ≤ 1200

B x+y ≤ 50

   45x+ 30y ≤ 1200

C x+y ≤ 1200

   30x+ 45y ≤ 1200

D x+y ≤ 50

   x/30 + y/45 ≤ 1200

Sol: total no of cartons is x +y which should be less than 50;

Total apples is 30x + 45y which should be less than 1200

Hence :   x+y ≤ 50

                 30x+ 45y ≤ 1200

---

10)

x	f(x)	g(x)
3	6	7
5	4	3
8	5	9

Functions f(x) and g(x) are defined by the above table.

According to the table, what is the value of f(g(f(8)))?

A 7

B 6

C 5

D 4

Sol: f(8) = 5; g(5) = 3; f(3) = 6

number of steps rahul plans to walk per day	33000
number of villages passing during the journey	9
no of steps per kilo meter	1320
number of klometers for the entire journey	450
number of resting points during the journey	30

11)

Rahul plans for long distance walking. The table above gives information about the number of steps Rahul plans to walk per day, total number of kilometers he plans to cover. If Rahul walks at a constant rate shown in the table, Which of the following is closest to the number of days it will take to complete the journey?

A 20

B 18

C 16

D 14

Sol: number of kilometers Rahul walks per day = 33000/1320 = 25

Number of days for the journey = 450/25 = 18

12) The weight of a truck is 24.15 tons without any load. This truck carries boxes which weigh 1.5 tons. The maximum capacity of a newly built bridge is 35tons. If x represents the number of boxes in the truck, which of the following inequality describes the total weight of the truck along with the boxes at or above the maximum capacity of the bridge?

A $1.5x \leq 35 + 24.15$

B $1.5 + x \geq 35$

C $1.5x \geq 35$

D $24.15 + 1.5x \geq 35$

Sol: the total weight of the truck along with x boxes is 24.15 + 1.5x. this has to be greater than 35.

$24.15 + 1.5x \geq 35$

---

13) Random sampling question
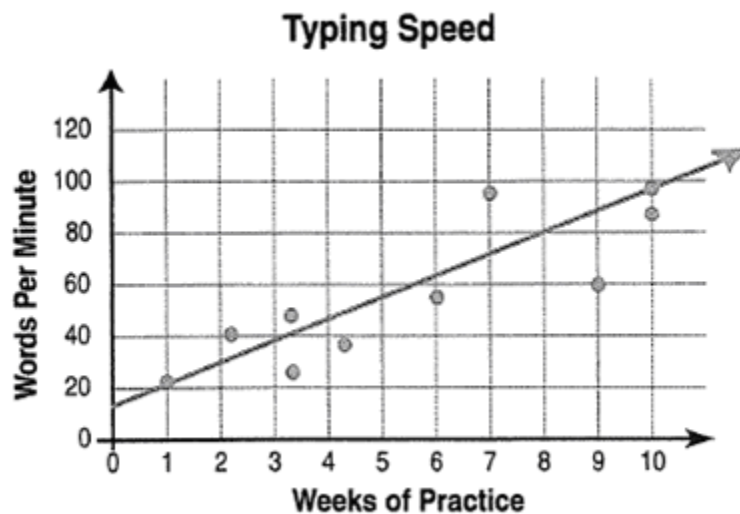
Typing Speed

14) According to the line of best fit in the scatter plot above, which of the following best approximates the number of weeks practiced if a person's typing speed is estimated to be 90 words per minute?

A 8

B 8.5

C 9

D 10

Sol: looking at the graph, 90 words per minute intersects the graph at 9 weeks of practice

---

15)   The distance travelled by moon around the earth in one full orbit is about 1,423,000 miles. Moon takes 27.3 days to complete one full orbit. Of the following, which is closest to the average speed of moon, in miles per hour, around the earth?

A 2172

B 4200

C 8400

D 16800

Sol: the average speed of the moon = 1423000/(27.3x24)

= 2172

---

16)

	score greater than or equal to 700	score less than 700
took coaching	84	16
did not take coaching	21	79

The table above summarizes the results of 200 students who took SAT exam. If a student is randomly selected from students who got a score greater than or equal to 700, what is the probability that the person chosen has taken coaching?

A 84/100

B 84/105

C 84/ 200

D 21/105

Sol: probability = 84/(84+21) = 84/105

---

17)   There are approximately 200 kilo calories per 100 gram of cooked salmon. Number of kilo calories per 100 grams of cooked chicken is approximately 20% less than that of 100 grams of cooked salmon. Which of the following best approximates the number of calories in 100 grams of cooked chicken?

A 80

B 100

C 160

D 200

Sol: 20% less than 200 = 200x(.80) = 160

---

18)   The US Census Bureau reported a median personal income of $30,240 for all workers over age 15 with income, and a mean personal income of $44,510 based on the Population Survey for 2015. Which of the following situations could explain the difference between the mean and median personal income in US?
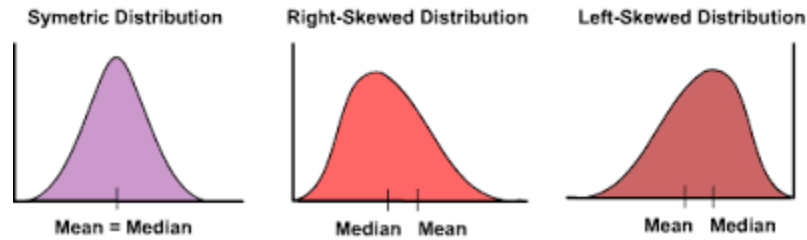
A the personal income for all the workers are close to each other

B there are few workers whose personal income is much less than the rest

C there are few workers whose personal income is much more than the rest

D many of the workers have personal income between 30,240 and 44,510

Sol:

Symetric Distribution	Right-Skewed Distribution	Left-Skewed Distribution

Mean = Median   Median Mean   Mean Median

Since mean is greater than the median , it is right skewed.
There are only few people greater than the mean

Questions 19 and 20 refer to the following information.

A physiologist chooses 200 couples at random from each of two towns in California and asked each couple how many children they have. The results are shown in the table below.

couple's children survey		
number of children	town A	town B
0	32	20
1	26	18
2	76	72
3	44	54
4	22	36

There are a total of 3600 couples in town A and 2800 couples in town B

19)   What is the median number of children for all 400 couples surveyed?

A 0

B 1

C 2

D 3

Sol: median is around 400/2 = 200 and 201

32 + 20 = 52 couples have 0 children
52 + 26+18 = 96 couples have 0 or 1 children
96 + 76+72 = 244, so 200th and 201th terms have 2 children

---

20)   Based on the survey data, which of the following most accurately compares the expected total number of couples with zero children in the two towns?

A The total number of couples with zero children in town A is expected to be 12 more than town B

B the total number of couples with zero children is expected to be equal in the two towns

C The total number of couples with zero children in town A is expected to be 296 more than town B

D The total number of couples with zero children in town A is expected to be 800 more than town B

Sol: (32/200)3600 – (20/200)2800

$\quad$ = 576- 280 = 296

---

21) Stefen and Diana agreed to date on 14th February in a coffee shop. Whoever comes first waits only for 20 minutes. If within the 20 minutes the other person didn't show up, the first person leaves the place. Stefen arrives x minutes after 5pm and Diana arrives y minutes after 5pm. which of the following inequality gives the condition that they meet in terms of arrival time x of Stefen and arrival time y of Diana?

A $x < y+20$

B $x > 20-y$

C $x < 20-y$

D $-20<x-y<20$

Sol : the positive difference of the arrival times should be less than 30 minutes. $|x-y| <30$. Or $-30<x-y<30$

The force of gravity is directly proportional to the product of the two masses and inversely proportional to the square of the distance of separation given by the following formula.

$$F = (Gm_1m_2)/r^2$$

F = force of gravity;
G = universal gravitational constant
m_1 m_2 = mass of objects;
r = distance between the two objects

22) Which of the following expresses universal gravitational constant in terms of other variables?

A $G = (F)/(m_1m_2 r^2)$

B $G = (F r^2)/(m_1m_2)$

C $G = (F m_1m_2)/r^2$

D $G = (m_1m_2)/Fr^2$

Sol: $F = (Gm_1m_2)/r^2$

$G = (F r^2)/(m_1m_2)$

23) If the masses of two objects are doubled and the distance is halved, then the new force of gravity between the two objects is what times the old force of gravity?

A 16

B 8

C 4

D remains the same

Sol : $F = (G(m_1/2)(m_2/2))/(r/2)^2 = 16 (Gm_1m_2)/r^2$

24) $x^2+y^2-6x-4y = 3$

The equation of the circle in the xy plane is shown above. Which of the following is the center and radius of the circle?

A center is (3,2) and radius is 4
B center is (3,2) and radius is 3
C center is (2,3) and radius is 4
D center is (2,3) and radius is 3
Sol: $x^2 +y^2-6x-4y = 3$;
 $x^2 -6x +9 +y^2 -4y +4 = 3+9 +4$;
$(x-3)^2 +(y-2)^2 = 16= 4^2$
So center is (3,2) and radius is 4

25) (a,b) and (c,d) are two points on the line l in the xy plane. If a>c and b<d , which of the following is true about the slope of the line l?
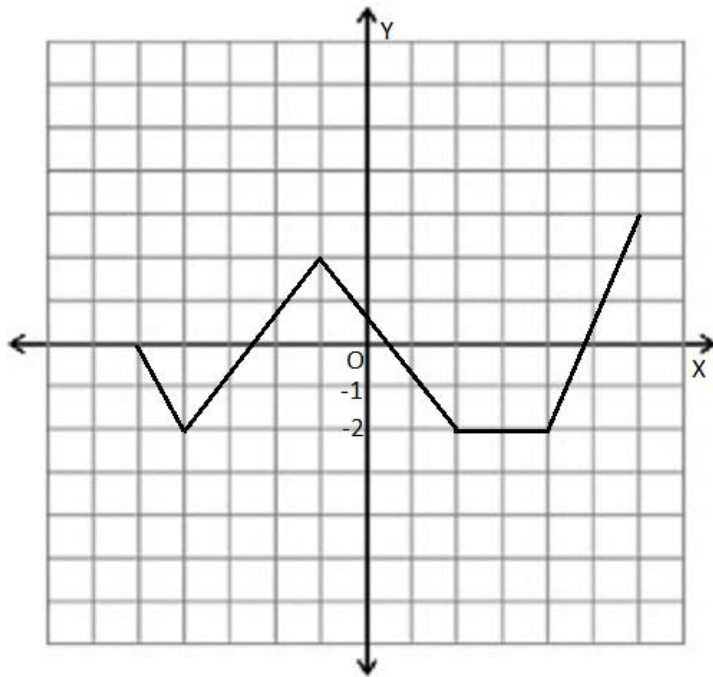
A it is negative
B it is positive
C it equals zero
D it is undefined
Sol: slope = (d-b)/(c-a) = +ve/-ve = -ve
Hence the slope of the line is negative

26)

The complete graph of the function f is shown in the xy plane. Which of the following is equal to -2?
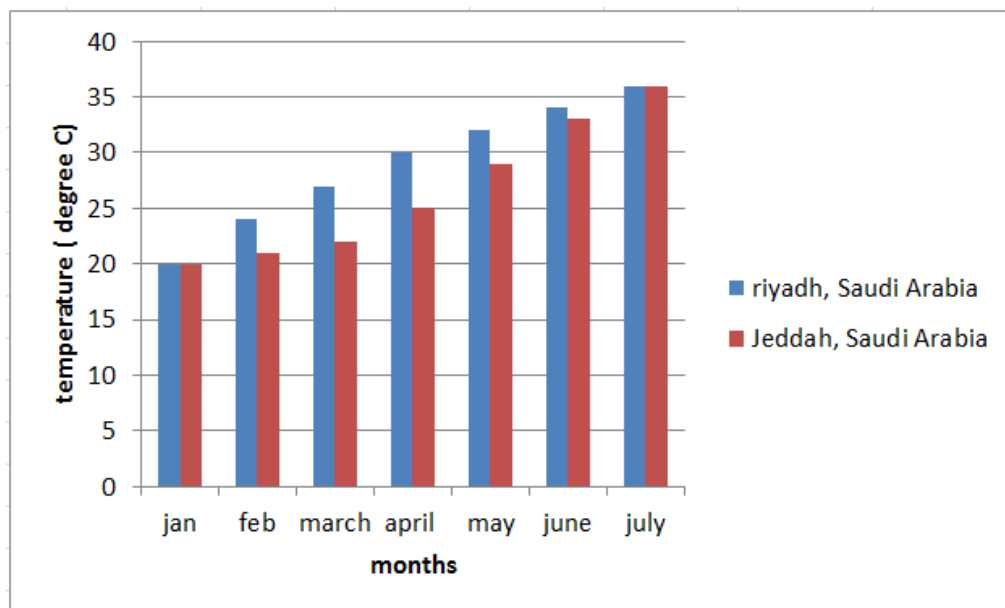
I   f(-4)

II f(5/2)

III f(4)

A III only

B I and III only

C II and III only

D I, II and III

Sol: f(-4) = -2; F(2.5) = -2; f(4) = -2;

27)

The graph above shows the temperature in two cities Riyadh and Jeddah from January to July. Which of the following statements correctly compares the average rates at which the temperatures in the two cities change?

A every month, the magnitude of the rate of change of temperature in Jeddah is more than Riyadh

B every month, the magnitude of the rate of change of temperature in Riyadh is more than Jeddah

C from January to april, the rate of change of temperature of Jeddah is more than Riyadh. And from april to july , the rate of change of temperature of Riyadh is more than jeddah

D from January to april, the rate of change of temperature of Riyadh is more than jeddah. And from april to july , the rate of change of temperature of jeddah more than Riyadh

Sol: through observation we see that temperature increases rapidly in Riyadh than Jeddah from January to april. And temperature increases rapidly in Jeddah than Riyadh from april to july.

---

28) In the xy plane , AC is the diameter of the circle. B lies on the circle. The coordinates of points A and B are (1,4) and (3,8). Which of the following is the equation of the line that passes through points B and C?

A x - 2y = 19
B x + 2y = 19
C x + 2y = 17
D x + 2y = 15
Sol: AB and BC are perpendicular, since AC is a diameter.

Slope of AB = (8-4)/(3-1) = 4/2 = 2; slope of BC = -1/2;
Equation of a line passing through (3,8) and a slope -1/2 is

$$x + 2y = 19;$$

---

29) $y = 3(x-1)^2 +2$;

$$Y = b(x-1)^2 + c$$

In the system of equations above , for what values of b and c does the system of equations have exactly two real solution?
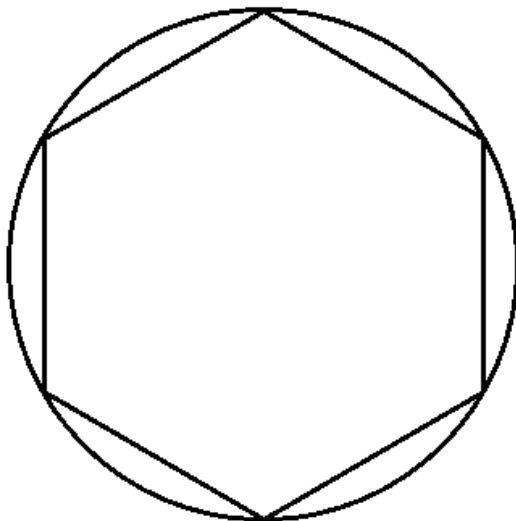
A $b = 2; c = 2$

B $b = 4; c = -2$

C $b = 2; c = 1$

D $b = 4; c = 3$

Sol: $3(x-1)^2 +2 = b(x-1)^2 + c$;

$(x-1)^2(3-b) = c-2$; $(x-1)^2 = (c-2)/(3-b)$

Only for $b = 4; c = -2$, $(x-1)^2 = 4$ two real solutions exist

---

30)

The figure above shows a regular hexagon with sides of length a. A circle is circumscribed passing through all the vertices of the hexagon. If the area of the hexagon is 216√3 square inches, what is the area of the circle in square inches?

A 144 π
B 100 π
C 81 π
D 12 π

Sol: regular hexagon is made of 6 equilateral triangles.

$6 (√3a^2/4) = 216√3$; a = 12;

Area of the circle is 144π

---

31) Vincent can read 150 words per minute. How many minutes will it take for Vincent to read 7 pages if each page has exactly 300 words?

14

Sol: total number of words = 7x300= 2100 words;

No of minutes = 2100/150 = 14 minutes

---

32) If d days and 8 hours is equal to 128 hours, then what is the value of d?

5

Sol: a day has 24 hours; total no of hours = 24d+8 = 128;

D = 5

33) In the xy plane, the graph of the function $g(x) = x^3 + 3x^2 - 5x + a - 4$ intersects the y-axis at 5 units above the origin. What is the value of a?

| 9 |

Sol: the point (0,5) is on the graph $g(x) = x^3 + 3x^2 - 5x + a - 4$;

   $5 = a - 4$; $a = 9$

34) In a math exam, victor and wales scored a combined total of 170 marks. If victor scored 10 marks more than wales, how many marks wales scored in the math exam?

| 80 |

Sol: $v + w = 170$; $v - w = 10$;
   $2w = 160$; $w = 80$

$$S = 3500 + 150p$$

35) vivin, A sales employee is paid a fixed salary and a commission based on the number of products he sold. The equation above models his salary S in dollars and p number of products sold. According to the model, what is the fixed salary of vivin? (Disregard the $ sign when gridding your answer)

| 3500 |

Sol: since $S = 3500 + 150p$ and p is the number of products he sells;

 The fixed salary is 3500$ and the variable salary per product is 150$

36) In the figure above, AC and BC are tangents to the circle with center o at points A and B respectively. If the length of the minor arc AB is 4π, what is the area of the quadrilateral OACB?

$$\boxed{64}$$

Sol: angle AOB = 90, hence OACB is a square.

$4\pi = (90/360)2\pi r$; r = 8; area of the square is 64.

Questions 37 and 38 refer to the following information.

In a small town, the number of people who will vote in the next election $N_{next\ year}$ which occurs every year can be estimated from the number of people who actually voted this year $n_{this\ year}$ by the equation below.

$$N_{next\ year} = n_{this\ year} + 400(1- n_{this\ year}/T)^2$$

The constant T in this equation is the total number of people in the town There are 500 people who voted this year.

37) According to the formula, what will be the number of voters two years from now if T = 1000?

$$\boxed{664}$$

Sol: $N_2 = 500 + 400(1-500/1000)^2$;

$N_2 = 600$;

$N_3 = 600 + 400(1-600/1000)^2$

$N_3 = 664$

---

38) if the number of voters this year is 500 and it is estimated that the number of voters next year is 525, What is the constant T in this equation

$$\boxed{667}$$

(ie. Total number of people in the town)?(round your answer to the nearest whole number)

Sol: $525 = 500 + 400(1-500/T)^2$

$25/400 = (1-500/T)^2$

$1/16 = (1-500/T)^2$

$¼ = 1-500/T$; $T = 2000/3 = 667$