XAT 2017

Quantitative Ability

46. The sum of series, (-100) + (-95) + (-90) + ……+ 110 + 115 + 120, is:

A 0

B 220

C 340

D 450

E None of the above

47. Four two-way pipes A, B, C and D can either fill an empty tank or drain the full tank in 4, 10, 12 and 20 minutes respectively. All four pipes were opened simultaneously when the tank is empty. Under which of the following conditions the tank would be half filled after 30 minutes?

A Pipe A filled and pipes B, C and D drained

B Pipe A drained and pipes B, C and D filled

C Pipes A and D drained and pipes B and C filled

D Pipes A and D filled and pipes B and C drained

E None of the above

48. A shop, which sold same marked price shirts, announced an offer - if one buys three shirts then the fourth shirt is sold at a discounted price of ₹ 100 only. Patel took the offer. He left the shop with 20 shirts after paying ₹ 20,000. What is the marked price of a shirt?

A ₹ 1260

B ₹ 1300

C ₹ 1350

D ₹ 1400

E ₹ 1500

49. AB is a chord of a circle. The length of AB is 24 cm. P is the midpoint of AB. Perpendiculars from P on either side of the chord meets the circle at M and N respectively. If PM < PN and PM = 8 cm. then what will be the length of PN?

A 17 cm

B 18 cm

C 19 cm

D 20 cm

E 21 cm

50. If x and y are real numbers, the least possible value of the expression $4(x-2)^2+4(y-3)^2-2(x-3)^2$ is :

A - 8

B - 4

C - 2

D 0

E 2

51. If f(x) = ax + b, a and b are positive real numbers and if f(f(x)) = 9x + 8, then the value of a + b is:

A 3

B 4

C 5

D 6

E None of the above

52. Arup and Swarup leave point A at 8 AM to point B. To reach B, they have to walk the first 2 km, then travel 4 km by boat and complete the final 20 km by car. Arup and Swarup walk at a constant speed of 4 km/hr and 5 km/hr respectively. Each rows his boat for 30 minutes. Arup drives his car at a constant speed of 50 km/hr while Swarup drives at 40 km/hr. If no time is wasted in transit, when will they meet again?

A At 9.15 AM

B At 9.18 AM

C At 9.21 AM

D At 9.24 AM

E At 9.30 AM

53. Hari's family consisted of his younger brother (Chari), younger sister (Gouri), and their father and mother. When Chari was born, the sum of the ages of Hari, his father and mother was 70 years. The sum of the ages of four family members, at the time of Gouri's birth, was twice the sum of ages of Hari's father and mother at the time of Hari's birth. If Chari is 4 years older than Gouri, then find the difference in age between Hari and Chari.

A 5 years

B 6 years

C 7 years

D 8 years

E 9 years

54. In a True/False quiz, 4 marks are awarded for each correct answer and 1 mark is deducted for each wrong answer. Amit, Benn and Chitra answered the same 10 questions, and their answers are given below in the same sequential order.
AMIT T T F F T T F T T F
BENN T T T F F T F T T F
CHITRA T T T T F F T F T T
If Amit and Benn both score 35 marks each then Chitra's score will be:

A 10

B 15

C 20

D 25

E None of the above

55. In a class of 60, along with English as a common subject, students can opt to major in Mathematics, Physics, Biology or a combination of any two. 6 students major in both Mathematics and Physics, 15 major in both Physics and Biology, but no one majors in both Mathematics and Biology. In an English test, the average mark scored by students majoring in Mathematics is 45 and that of students majoring in Biology is 60. However, the combined average mark in English, of students of these two majors, is 50. What is the maximum possible number of students who major ONLY in Physics?

A 30

B 25

C 20

D 15

E None of the above

56. If $5° \leq x° \leq 15°$, then the value of sin 30° + cos x° - sin x° will be :

A Between -1 and -0.5 inclusive

B Between -0.5 and 0 inclusive

C Between 0 and 0.5 exclusive

D between 0.5 and 1 inclusive

E None of the above

57. The Volume of a pyramid with a square base is 200 cubic cm. The height of the pyramid is 13cm. What will be the length of the slant edges (i.e. the distance between the apex and any other vertex), rounded to the nearest integer?

A 12 cm

B 13 cm

C 14 cm

D 15 cm

E 16 cm

58. A dice is rolled twice. What is the probability that the number in the second roll will be higher than that in the first?

A 5/36

B 8/36

C 15/36

D 21/36

E None of the above

59. An institute has 5 departments and each department has 50 students. If students are picked up randomly from all 5 departments to form a committee, what should be the minimum number of students in the committee so that at least one department should have representation of minimum 5 students?

A 11

B 15

C 21

D 41

E None of the above.

60. If $N = (11^{p+7})(7^{q-2})(5^{r+1})(3^{s})$ is a perfect cube, where p, q, r and s are positive integers, then the smallest value of $p + q + r + s$ is :

A 5

B 6

C 7

D 8

E 9

61. AB, CD and EF are three parallel lines, in that order. Let d1 and d2 be the distances from CD to AB and EF respectively. d1 and d2 are integers, where d1 : d2 = 2 : 1. P is a point on AB, Q and S are points on CD and R is a point on EF. If the area of the quadrilateral PQRS is 30 square units, what is the value of QR when value of SR is the least?

A slightly less than 10 units

B 10 units

C slightly greater than 10 units

D slightly less than 20 units

E slightly greater than 20 units

62. ABCD is a rectangle. P, Q and R are the midpoint of BC, CD and DA. The point S lies on the line QR in such a way that SR: QS = 1:3. The ratio of the area of triangle APS to area of rectangle ABCD is

A 36/128

B 39/128

C 44/128

D 48/128

E 64/128

Instructions [63 - 64]

In an innings of a T20 cricket match (a team can bowl for 20 overs) 6 bowlers bowled from the fielding side, with a bowler allowed maximum of 4 overs. Only the three specialist bowlers bowled their full quota of 4 overs each, and the remaining 8 overs were shared among three non-specialist bowlers. The economy rates of four bowlers were 6, 6, 7 and 9 respectively. *(Economy rate is the total number of runs conceded by a bowler divided by the number of overs bowled by that bowler)*. This however, does not include the data of the best bowler *(lowest economy rate)* and the worst bowler *(highest economy rate)*. The number of overs bowled and the economy rate of any bowler are in integers.

63. Read the two statements below:

S1: The worst bowler did not bowl the minimum number of overs.
S2: The best bowler is a specialist bowler.

Which of the above statements or their combinations can help arrive at the minimum number of overs bowled by a non-specialist bowler?

A S1 only.

B S2 only.

C Either S1 or S2.

D S1 and S2 in combination.

E The minimum number of overs can be determined without using S1 or S2.

64. Read the two statements below:

S1. The economy rates of the specialist bowlers are lower than that of the non-specialist bowlers.
S2. The cumulative runs conceded by the three non-specialist bowlers were 1 more than those conceded by the three specialist bowlers.

Which of the above statements or their combinations can help arrive at the economy rate of the worst bowler?

A S1 only.

B S2 only.

C Either S1 or S2.

D S1 and S2 in combination.

E The economy rate can be calculated without using S1 or S2.

Instructions [65 - 68]

Abdul has 8 factories, with different capacities, producing boutique kurtas. In the production process, he incurs raw material cost, selling cost (for packaging and transportation) and labour cost. These costs per kurta vary across factories. In all these factories, a worker takes 2 hours to produce a kurta. Profit per kurta is calculated by deducting raw material cost, selling cost and labour cost from the selling price (Profit = selling price - raw materials cost - selling cost - labour cost). Any other cost can be ignored.

Exhibit : Business Details of Abdul's 8 Factories

	Production Capacity	Selling Price / Kurta	Profit / Kurta	Selling Cost / Kurta	Labour Cost / Hour
#	(No of Kurtas)	₹	₹	₹	₹
Factory 1	2500	4800	775	60	450
Factory 2	1500	5300	800	45	400
Factory 3	800	5800	900	60	550
Factory 4	1000	5500	800	68	450
Factory 5	1500	5400	600	75	600
Factory 6	1100	6000	875	65	400
Factory 7	2500	4900	500	85	350
Factory 8	2000	5300	600	70	420

65. Which of the following options is in decreasing order of raw materials cost per kurta?

A Factory 3, Factory 4, Factory 7, Factory 5

B Factory 4, Factory 3, Factory 2, Factory 5

C Factory 6, Factory 3, Factory 5, Factory 7

D Factory 6, Factory 8, Factory 7, Factory 2

E Factory 8, Factory 3, Factory 2, Factory 4

66. Which of the factories listed in the options below has the lowest sales margin (sales margin = profit per kurta divided by selling price per kurta)?

A Factory 2

B Factory 4

C Factory 5

D Factory 6

E Factory 7

67. Abdul has received an order for 2,000 kurtas from a big retail chain. They will collect the finished pre-packaged kurtas directly from the factories, saving him the selling cost. To deliver this order, he can use multiple factories for production. Which of the following options will ensure maximum profit from this order?

A Factory 1

B Factories 2 and 3

C Factories 4 and 6

D Factories 3, 6 and 4

E Factory 1 or Factory 7 or Factory 8

68. Abdul has introduced a new technology in all his factories. As a result, a worker needs just 1.5 hours to produce a kurta. If raw materials cost and selling cost remain the same, which of the factories listed in the options below will yield the highest profit per kurta?

A Factory 2

B Factory 3

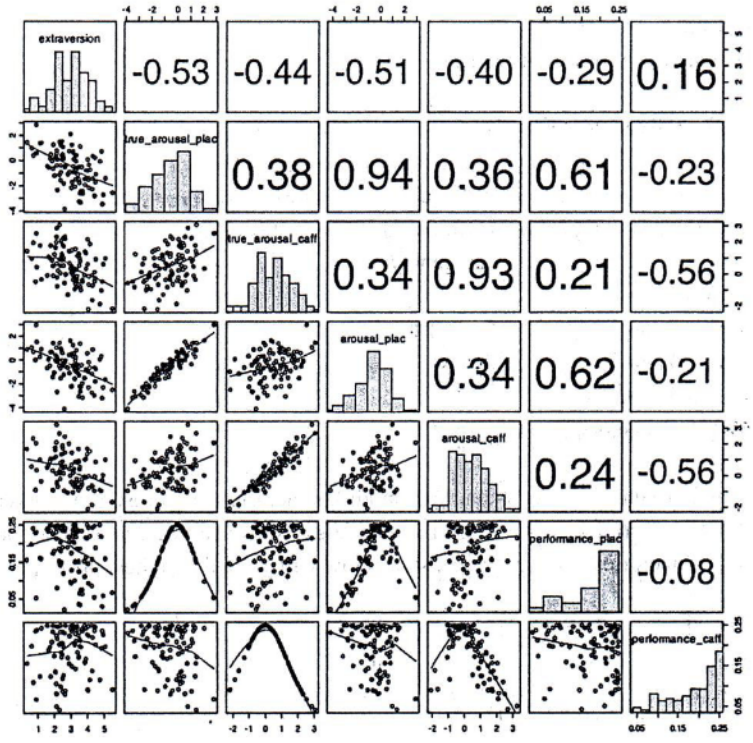
C Factory 4

D Factory 5

E Factory 6

Instructions [69 - 72]

The grid below captures relationships among seven personality dimensions: "extraversion", "true_arousal_plac", "true_arousal_caff", "arousal_plac", "arousal_caff", "performance_plac", and "performance caff". The diagonal represents histograms of the seven dimensions. Left of the diagonal represents scatterplots between the dimensions while the right of the diagonal represents quantitative relationships between the dimensions. The lines in the scatterplots are closest approximation of the points. The value of the relationships to the right of the diagonal can vary from -1 to +1, with -1 being the extreme linear negative relation and +1 extreme linear positive relation. (Axes of the graph are conventionally drawn).



69. Which of the following is true?

A "Extraversion" has two modes.

B Median for "arousal_plac" is definitely the same as its average.

C Median for "arousal_caff" is definitely higher than its average.

D Median for "performance_plac" is definitely lower than its average.

E Median for "performance_caff" is definitely lower than its average.

70. Which of the scatterplots shows the weakest relationship?

A Between "extraversion" and "performance_caff".

B Between "true_arousal_plac" and "arousal_plac".

C Between "true_arousal_plac" and "performance_plac".

D Between "true_arousal_caff" and "performance_caff".

E Between "arousal_caff" and "performance_caff".

71. In which of the following scatterplots, the value of one dimension can be used to predict the value of another, as accurately as possible?

A "extraversion" and "true_ arousal_caff'

B "true_arousal_plac" and “arousal_plac"

C "true_arousal_plac" and "performance_plac"

D "true_arousal_plac" and "performancc_caff"

E All the above are irrelevant relations.

72. Which of the following options is correct?

A 0.93 on the right side of the diagonal corresponds to the third scatterplot in the fourth row.

B 0.94 on the right side of the diagonal corresponds to the second scatterplot in the fourth row.

C 0.38 is the relationship between "extraversion" and "true_arousal_plac".

D "arousal_catr” and "performance_caff" arc positively related.

E The line that captures relationship between "arousal_caff" and "arousal_plac" can be denoted by equation: y-= a-bx, where b>0.

Answers

46.**D**	47.**A**	48.**B**	49.**B**	50.**B**	51.**C**	52.**D**	53.**E**
54.**A**	55.**D**	56.**E**	57.**C**	58.**C**	59.**C**	60.**E**	61.**E**
62.**A**	63.**E**	64.**D**	65.**A**	66.**E**	67.**D**	68.**B**	69.**A**
70.**A**	71.**C**	72.**B**					

Explanations

46. **D**
The given series is (-100)+ (-95)+ (-90)+....+110 + 115 + 120.
We can observe that -100 will cancel out 100, -95 will cancel out 95 and so on. Therefore, the only terms that will be remaining are 105, 110, 115 and 120.
Sum of the series = 105 + 110 + 115 + 120 = 450.
Therefore, option D is the right answer.

47. **A**
Let us assume the volume of the tank to be 60 litres.
A can fill or empty 60/4 = 15 litres in a minute.
B can fill or empty 60/10 = 6 litres in a minute.
C can fill or empty 60/12 = 5 litres in a minute.
D can fill or empty 60/20 = 3 litres in a minute.

We have to find the combination for which the tank will be half-full in 30 minutes (i.e., completely filled in 1 hour).
Therefore, the combination must result in a net input of 60/60 = 1 litre per minute.

Let us evaluate the options.
Option B**:**
Pipe A drained and pipes B, C and D filled

The net result will be -15 + 6 + 5 + 3 = -1 litre/minute. We can eliminate option B.

Option C:
Pipes A and D drained and pipes B and C filled

The net result will be -15-3+6+5 = -7 litres/minute. We can eliminate option C as well.

Option D:
Pipes A and D filled and pipes B and C drained
The net result will be 15+3-6-5 = 7 litres/minute. We can eliminate option D as well.

Option A:
Pipe A filled and pipes B, C and D drained

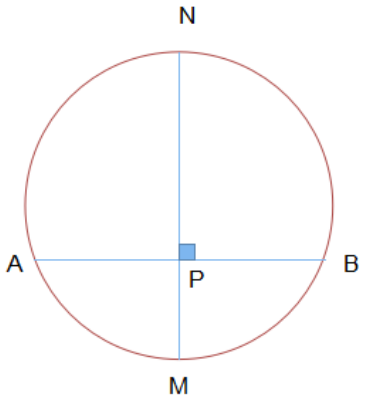
The net result will be 15-6-5-3 = 1 litre/minute.
Therefore, option A is the right answer.

48. **B**
Patel bought 20 shirts. He would have gotten every fourth shirt at Rs. 100. He would have paid the marked price for 15 shirts and would have gotten 5 shirts at Rs. 100 each.

Let the marked price of one shirt be 'x'.
15x + 5*100 = 20000
15x = 19500
x = 19500/15 = Rs. 1300.
The marked price of a shirt is Rs. 1300. Therefore, option B is the right answer.

49. **B**

Let us draw the diagram using the given conditions.



AB = 24 cm and P is the mid-point of AB. Therefore, AP=PB=12 cm.
MN is perpendicular to AB and passes through P.
PM < PN. Therefore, M should be closer to A and B than N.
MN and AB are 2 perpendicular chords intersecting at P.
Therefore, according to the intersecting chords theorem, AP*PB = PM*PN
12*12=8*PN
=> PN = 18 cm.
Therefore, option B is the right answer.

50. **B**

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

y is an independent variable. The value of y is unaffected by the value of x. Therefore, the least value that the expression $4(y-3)^2$ can take is 0 (at $y=3$).

Let us expand the remaining terms.

$4(x-2)^2-2(x-3)^2$=4*$(x^2-4x+4)-2*(x^2-6x+9)$

$=2x^2-4x-2$

=$2(x^2-2x-1)$

=$2(x^2-2x+1-2)$

=$2((x-1)^2-2)$

The least value that the expression $(x-1)^2$ can take is 0 (at x = 1)

Therefore, the least value that the expression $2((x-1)^2-2$ can take is $2*(0-2)=2*(-2)=-4$

Therefore, option B is the right answer.

51. **C**

$f(x) = ax + b$.
$f(f(x)) = f(ax + b) = a(ax + b) + b = a^2x + ab + b$
We have been given that $f(f(x) = 9x + 8$
$9x + 8 = a^2x + ab + b$
Equating the co-efficient of x, we get, $a^2 = 9$. Therefore, a can be 3 or -3. But, it has been given that a is a positive real number.
Equating the constants, we get, $ab + b = 8$
If we substitute $a = 3$, we get, $3b + b = 8$
$4b = 8$
$b = 2$
Therefore, $a + b = 3 + 2 = 5$
Therefore, option C is the right answer.

52. **D**
Both of them row the boat for the same time. Therefore, we can ignore the time taken to row the boat and add it to the final answer.
Arup will walk 2 km in 2/4 = 30 minutes.
Swarup will walk 2 km in 2/5 = 24 minutes.

Therefore, Swarup will start driving 30-24 = 6 minutes earlier than Arup.
In 6 minutes, Swarup will gain a lead of 6*40/60 = 4 km.
Arup drives at 50 kmph (i.e, 10 kmph faster than Swarup). Therefore, Arup will cover the 4 km advantage that Swarup has in 4/10*60 = 24 minutes.
Therefore, the time after which both of them will meet is 30 (to walk) + 30 (to row the boat) + 24 = 1 hour 24 minutes after Arup starts.
Since both of them start at 8 AM, they will meet again at 9:24 AM.
Therefore, option D is the right answer.

53. **E**
Let the age of the father be 'f', mother be 'm', Hari be 'h', Chari be 'c'. It has been given that Chari is 4 years older than Gouri. Therefore, the age of Gouri is c-4.

When Chari was born, the sum of the ages of Hari, his father and mother was 70 years.
If Chari's age is 'c' now, then Chari's father's age when Chari was born would have been 'f-c' (i.e, Current age - the number of years that has passed after Chari's birth). The same holds true for all the family members.

=> f - c + m - c + h - c = 70
f+m+h-3c = 70 ----------(1)

The sum of the ages of the 4 family members when Gouri was born was twice the sum of the ages of the father and mother at the time of Hari's birth.

=> f-(c-4) + m -(c-4) + h -(c-4) + c - (c-4) = 2(f-h+m-h)
=> f + m + h + c - 4(c-4) = 2f + 2m - 4h
f+m+h-3c + 16 = 2f+2m-4h
Substituting (1), we get,
70 +16 = 2f+2m-4h
43 + 2h= f+m ----------(2)
Substituting (2) in (1), we get,
43 + 2h + h - 3c = 70

3h - 3c = 27
=> h-c = 9
Therefore, the difference between the age of Hari and Chari is 9 years. Therefore, option E is the right answer.

54. **A**

Both Amit and Ben scored 35 marks. 4 marks are awarded for a correct answer and 1 mark is deducted for an incorrect answer.
Let the number of questions that Amit got right be 'x'.
=> 4x -(10-x) = 35
5x = 45
x = 9.
Therefore, Amit must have made only 1 mistake. The same must have been the case with Ben too.
The responses given by the 3 persons are as follows:

AMIT T T F F T T F T T F
BENN T T T F F T F T T F
CHITRA T T T T F F T F T T

Amit and Ben have given different responses for question 3 and question 5. Therefore, one of them must be wrong in each of these questions. Also, Amit must have given the correct answer for one of these 2 questions and Ben must have answered the other one correct, since both of them got 9 questions correct.

Let us assume Amit has given an incorrect response for question 3 and Ben has given an incorrect response for question 5.
In this case, Chitra's would have given 4 correct responses (questions 1,2,3, and 9). Chitra's score would have been 4*4 - 6 = 10.

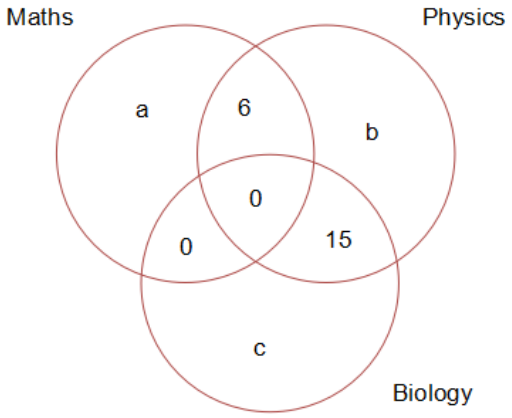
Let us assume Amit has given an incorrect response for question 5 and Ben has given an incorrect response for question 3.
In this case, Chitra's would have given 4 correct responses (questions 1,2,5, and 9). Chitra's score would have been 4*4 - 6 = 10.

Therefore, Chitra's score should have been 10 and hence, option A is the right answer.

55. **D**

Let us note down the information given:

No person can major in all 3 subjects. 6 students major in both Mathematics and Physics, 15 major in both Physics and Biology, but no one majors in both Mathematics and Biology. There are 60 students in total.



It has been given that average marks scored by students majoring in Maths in English is 45.
Average marks scored by students majoring in Biology in English is 60.

But the combined average marks scored by students majoring in Maths and Biology in English is 50.

=> $\frac{45 * (a+6) \ + 60 * (c+15)}{a+6+c+15} = 50$

$45a + 270 + 60c + 900 = 50a + 50c + 1050$

$5a = 10c + 120$

$a = 2c + 24$

To maximize b, we have to minimize 'a' and 'c'. The least value that 'c' can take is 0.

The corresponding value of a is 24.

24+6+b+15 = 60

=> b = 15.

Therefore, the maximum number of students who could have majored only in physics is 15. Therefore,option D is the right answer.

56. **E**

For smaller values of 'x', cos 'x' will be close to 1 and sin x will be close to 0.

Sin 30° = 1/2 = 0.5

As we move closer to 0, the value of cos x increases and sin x decreases. Therefore, when we move from a larger value of x to a smaller value, the value of the expression cos x - sin x will increase.

Let us evaluate the value of the expression at x= 30° (since we know the values of cos x° and sin x° at this point) and then logically deduce the range of the value of the expression.

At x = 30°, cos x = $\frac{\sqrt{3}}{2}$ and sin x = $\frac{1}{2}$

Therefore, cos x° - sin x° would have been 1.732/2 - 0.5 = 0.866 - 0.5 = 0.366

sin 30° + cos x - sin x will be 0.866

At x = 0, sin 30 + cos x - sin x will be 0.5 + 1 - 0 = 1.5.

At x = 5°, the value of the expression sin 30 + cos x - sin x will be slightly less than 1.5.

Therefore, we can infer that the upper limit of the expression will be greater than 1. None of the given limits include values greater than 1. Therefore, option E is the right answer.

Alternate solution:

The value of sin 15° and cos 15° can be found out using the identities sin (A-B) = sin A cos B - cos A sin B and cos (A-B) = cos A cos B + sin A sin B.

Substituting A = 45° and B = 15° in these expressions, we get,

sin 15° = 0.2588

cos 15° = 0.9659

sin 30° + cos 15° - sin 15° = 0.5 + 0.9659 - 0.2588 = 1.2071.

None of the given options capture this value in the range. Therefore, option E is the right answer.

57. **C**

Volume of the pyramid = 200 cubic cm.

The volume of a pyramid is usually a third of the volume of a cuboid of the same height.

Therefore, a square cuboid of the height of the pyramid will have a volume of 600 cubic cm.

We know that the height is 13 cm.

Area of the base square* height = 600 cm.

=> Area of the base square = $\frac{600}{13}$ cm^2.

Side of the base square = $\sqrt{\frac{600}{13}}$ cm.

Length of diagonal of the base square = $\sqrt{\frac{600}{13}} * \sqrt{2}$

Now, the height of slant edge of the pyramid can be found out by using the Pythagoras theorem.
Length of half the diagonal of the base square will form one of the sides and the height of the pyramid will form the other side. The slant height of the pyramid will be the hypotenuse of the right-angled triangle.

Height of slant edge = $\sqrt{13^2 + \frac{1}{4} * 2 * \frac{600}{13}}$

= $\sqrt{169 + \frac{600}{26}}$

= $\sqrt{\frac{4394+600}{26}}$

= $\sqrt{\frac{4994}{26}}$

=$\sqrt{192.07}$

=13.85 cm

The nearest integer is 14. Therefore, option C is the right answer.

58. **C**
A die is rolled twice.
The number of combinations that can occur = 6*6 = 36.
We have to find the probability of the second roll being higher than the first.
If we select 2 numbers out of the 6 and arrange them in ascending order, then we will obtain the scenario in which the number obtained in the second roll will be greater than the number obtained in the first roll.

2 numbers out of 6 numbers can be selected in 6C2 = 15 ways. The numbers can be arranged in ascending order in only one way.
Therefore, the required probability is 15/36.

Therefore, option C is the right answer.

59. **C**
We have to employ the pigeon hole principle to solve this problem.
The maximum number of students who can be picked from each department such that 5 students are not selected from the same department is 4.
Therefore, after 4 students from each department are selected (i.e., 4*5 = 20 students in total), the 21st student selected will be the fifth student to be selected from one of the 5 departments. Therefore, 20+1 = 21 students should be selected in total to ensure that at least five students from one of the departments is selected.
Therefore, option C is the right answer.

60. **E**
It has been given that $N = (11^{p+7})(7^{q-2})(5^{r+1})(3^s)$ is a perfect cube. All the factors given are prime.
Therefore, the power of each number should be a multiple of 3 or 0.

p, q, r and s are positive integers. Therefore, only the power of the expressions in which some number is

subtracted from these variables or these variables are subtracted from some number can be made 0.

11^{p+7}:

This expression must be made a perfect cube. The nearest perfect cube is 11^9. Therefore, the least value that p can take is $9-7=2$.

7^{q-2}

The least value that q can take is 2. If $q=2$, then the value of the expression 7^{q-2} will become $7^0=1$, without preventing the product from becoming a perfect cube.

5^{r+1}:

The least value that r can take is 2.

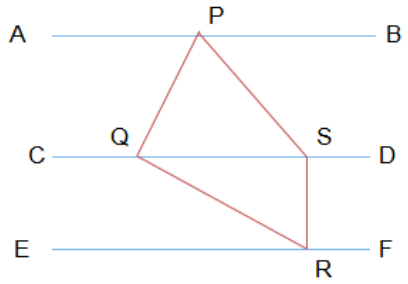
3^s):

The least value that s can take is 3.

Therefore, the least value of the expression $p+q+r+s$ is $2+2+2+3=9$.
Therefore, option E is the right answer.

61.**E**
There are 3 parallel lines AB, CD, and EF, in that order.
Let the distance between CD and AB be 2x.
It has been given that the distance between CD and EF is x.

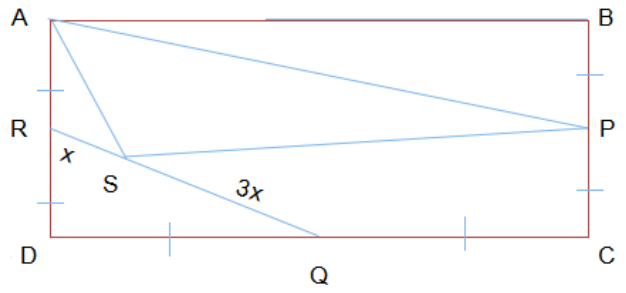
A quadrilateral PQRS is formed such that P is on AB, Q and S are on CD, and R is on EF.
Also, the length of SR is the least possible value it can take. Therefore, SR must be perpendicular to the parallel lines.



Area of quadrilateral PQRS = Area of triangle PQS + Area of triangle SRQ = 30 square cm.

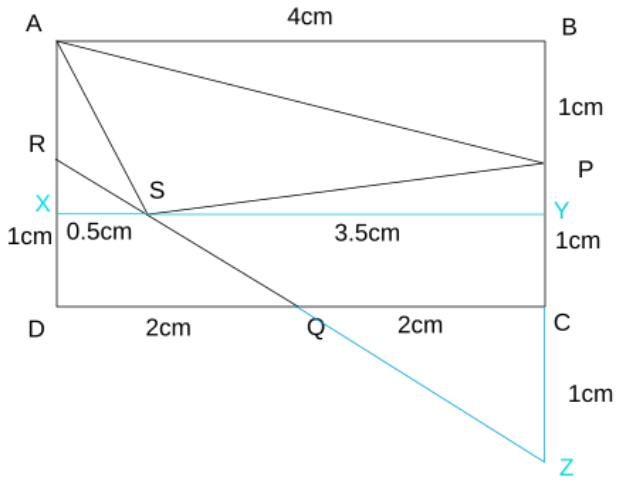
Area of triangle PQS = 2*area of triangle SRQ (Since they rest on the same base and height of SRQ is half the height of PQS)
=> Area of triangle SRQ = 10 square cm.
Let the length of SQ be b. We know that SR= x
$0.5*x*s=10$
=> $xs=20$
$s=20/x$

We do not have any other detail to evaluate the value of the expression. But, we have been given that d1 and d2 are integers. Therefore, the least value that 'x' can take is 1.
The least value that S can take is 1.
By Pythagoras theorem, $QR = \sqrt{s^2 + x^2}$
$QR = \sqrt{20^2 + 1}$
$QR = \sqrt{401}$
Therefore, the value of QR will be slightly greater than 20. Therefore, option E is the right answer.
62. **A**
First, let us construct the rectangle using the given information.



Let the length of the rectangle be 'l' and the breadth of the rectangle be 'b'.
Area of rectangle ABCD = lb.
We have to find the area of the triangle APS.

We consider length as 4cm and breadth as 2cm. (Answer is irrespective of length and breadth)



In triangle QRD

RS/RQ=XS/DQ

1/4=XS/2cm

XS= 0.5 cm

SY= 4cm-0.5cm= 3.5cm

We can now find the areas of all the sections.

area (RDQ)= 1/2 x 1cm x 2cm= $1cm^2$

area (ABP) =1/2 x 1cm x 4cm = $2cm^2$

area (ARS) =1/2 x 1cm x 0.5cm = $0.25cm^2$

area (PSQC) = Area (PSZ)-Area(QCZ)= 1/2 x 2cm x 3.5cm - 1/2 x 1cm x 2cm =

= $2.5cm^2$

Area (ABCD)= 4cm x 2cm = $8cm^2$

Area (APS) = 8 -1 -2 - 0.25 - 2.5 = $2.25cm^2$

Area (APS) / Area (ABCD) = 9/32 = 36/128

Hence answer (A).

63. **E**

Since only the specialist bowlers complete their quota of 4 overs, the maximum over a non-specialist bowler can bowl is three.

Total number of overs bowled by non-specialist bowlers = 8

If one of the three bowlers bowls 1 over, the other two will bowl 3 and 4 overs. Since the maximum over a non-specialist bowler can bowl is three, this is an invalid case.

If one of the non-specialist bowlers bowls 2 overs, the other two will bowl 3 overs each.

Thus, the minimum a non-specialist bowler can bowl is two overs.

Since the above calculation did not need either of S1 and S1,

The correct answer is E.

64. **D**

As per Statement given paragraph the economy rates are 6,6,7,9 which exclude best bowler and worst bowler

And Economy rates of specialist bowlers are lower than that of nonspecialist bowlers.

Let's take economy rates of specialist bowlers as 5, 6, 6.

Hence their cumulative runs would be (5 × 4) + (6 × 4) + (6 × 4) = 68
As per Statement 2, Total runs for non specialist bowlers =69. And their
economy rates are 7, 9. Let's take economy rate of worst bowler be x
(7 × 3) + (9 × 2) + (x × 3) = 69

=> x =10
For the lowest values of the specialist bowler we take 4. Then value of the worst bowler will be less than 9 which is incorrect.

Hence only a single case is possible.
So we can find the economy rate of worst bowler using both the statements.
Hence answer is option D.

65. **A**

Profit = selling price - raw materials cost - selling cost - labor cost

Hence, raw materials cost = selling price - profit - selling cost - labor cost

A worker takes 2 hour to produce a kurta.

Labor cost for Kurta = 2 * (Labor cost/ hour)

Raw materials cost per Kurta

for factory 2, 5300-800-45-400*2 = 3655

for factory 3, 5800-900-60-550*2 = 3740

for factory 4, 5500-800-68-450*2 = 3732

for factory 5, 5400-600-75-600*2 = 3525

for factory 6, 6000-875-65-400*2 = 4260

for factory 7, 4900-500-85-350*2 = 3615

for factory 8, 5300-600-70-420*2 = 3790

66. **E**

Sales margin = Profit per kurta/ selling price per kurta

for factory 2, sales margin = 800/5300 = 0.151

for factory 4, sales margin = 800/5500 = 0.145

for factory 5, sales margin = 600/5400 = 0.111

for factory 6, sales margin = 875/6000 = 0.146

for factory 7, sales margin = 500/4900 = 0.102

Factory 7 has lowest sales margin.

67. **D**

Profit = selling price - raw materials cost - selling cost - labor cost

Since selling cost is zero.

New Profit = Original Profit + Selling cost

Profit per Kurta

for factory 1, 775+60 = 835

for factory 2, 800+45 = 845

for factory 3, 900+60 = 960

for factory 4, 800+68 = 868

for factory 5, 600+75 = 675

for factory 6, 875+65 = 940

for factory 7, 500+85 = 585

for factory 8, 600+70 = 670

Arranging all factories in decreasing profits,

Factory (3>6>4>2>1>5>8>7)

Factories 3, 6 and 4 will ensure maximum profit.

68. **B**

Profit = selling price - raw materials cost - selling cost - labor cost

Hence, raw materials cost = selling price - profit - selling cost - labor cost

Raw materials cost per Kurta

for factory 2, 5300-800-45-400*2 ....(1)

After technology is introduced, a worker takes 1.5 hour to produce a kurta.

Labor cost per Kurta = 1.5 * (Labor cost/ hour)

New Profit = selling price - raw materials cost - selling cost - new labor cost

Profit per kurta

for factory 2 = 5300-(5300-800-45-400*2)-45-400*1.5 = 800 + 400*0.5 = Original Profit per kurta + 0.5*Labour cost per hour

= 1000

Similarly,

for factory 3, 900+550*0.5 = 1175

for factory 4, 800+450*0.5 = 1025

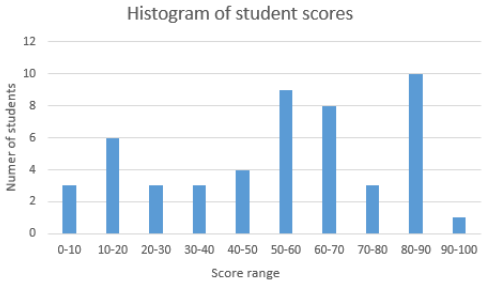
for factory 5, 600+600*0.5 = 900

for factory 6, 875+400*0.5 = 1075

Factory 3 will yield highest profit.

69. **A**

Histogram is a graph which depicts the frequency of occurence of values in different ranges.
For example, lets consider 50 students attended an exam. The distribution of number of students in different score ranges is depicted by the following histogram



In this question we have histograms for different personality dimensions.
However the x and y co-ordinates are not given.
Since the y co-ordinate gives us frequency/number of occurences of a certain value, we can use a histogram to calculate mean median and mode even without details of x-y co ordinate axes

Option A : "Extraversion" has 2 modes.

We can calculate mean of a histogram table by averaging all the values

We can calculate the median of a histogram table by arranging the histograms in ascending order and the bar/value which is in the middle will get the median.

Median for "arousal_plac" = -3

Avergae for "arousal_plac" = (-4-3-2+1+0-3-4)/7 = -15/7 = -2.143

Median for "arousal_caff" = 0

Average for "arousal_caff" = (-1.5-1.5+2+1.75+1.5+1.75+1+0-0.5-2-2)/11 = 0.0454

Median for "performance_plac" = 0.075

Average for "performance_plac" = (0.025+0.075+0.05+0.1+0.2)/5 = 0.09

Median for "performance_caff" = 0.075

Average for "performance_caff" = (0.05+0.25+0.09+0.075+0.08+0.075+0.085+0.1+0.1+0.15+0.18)/11 = 0.1122

70. **A**

+1 being the extreme linear positive relation and -1 being the extreme linear negative relation. Relationship is weakest when the value is closest to 0.
Among the given options, A is the weakest.

OR

Among the given plots, scattered plot between "extraversion" and "performance_caff" is the most scattered.
Therefore weakest relationship.

71. **C**
Scatterplot between "true_arousal_plac" and "performance_plac" is least scattered, which shows strong relationship between two dimensions.

72. **B**
0.94 is quantitative relationship between true_arousal_plac and arousal_plac. Scatterplot that shows this relationship is the second one in fourth row on the left side of the diagonal.