

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X

ANNUAL EXAMINATIONS 2022

Mathematics

Time: 1 hour 40 minutes Marks: 50

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.

Correct Way				Incorrect Ways					
1	(A)	(B)	●	(D)	1	(A)	(B)	☒	(D)
					2	(A)	(B)	●	(D)
					3	(A)	(B)	☒	(D)
					4	(A)	(B)	☒	(D)

Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. The marks obtained on the 50 MCQs will be equated to the total marks of 75 for the theory examination results.
8. You may use a simple calculator if you wish.

1. The given table represents the information about the age of the participants in a family gathering.

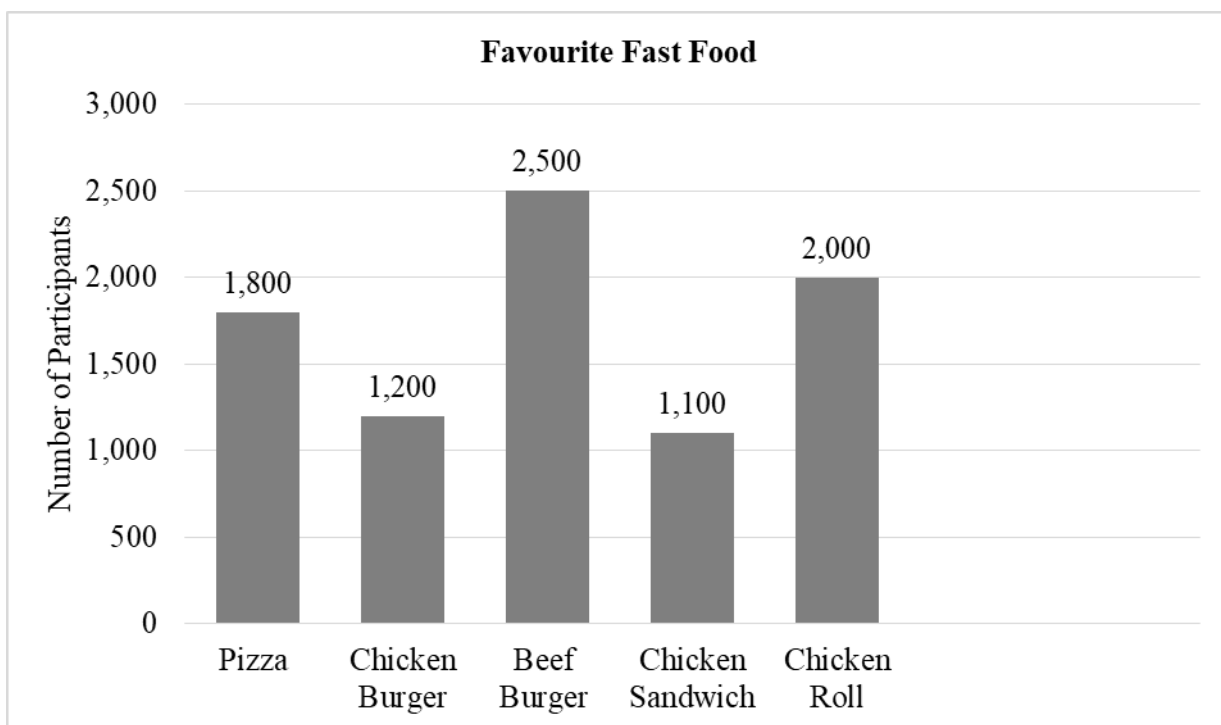
Age Limits (in year)	Age of the Participant	Number of Participants
5 – 14	6, 7, 9, 14, 7, 8, 9, 11, 9	9
15 – 24	16, 15, 15, 17, 18, 19, 19, 20, 21, 22, 22, 23, 21, 20, 15	15
25 – 34	25, 25, 26, 27, 29, 30, 31, 32, 33, 34, 32, 30, 29, 28, 28, 28, 25, 28, 28	?
35 – 44	35, 35, 36, 37, 37, 38, 39, 40, 41, 42, 38, 37, 37, 36, 35, 37	16
45 – 54	46, 47, 48, 49, 50, 54	6
Total	-	

The number of the participants that belongs to the age limit 25 – 34 is

- A. 15
- B. 16
- C. 19
- D. 20

Use the given information to answer Q.2. and Q.3.

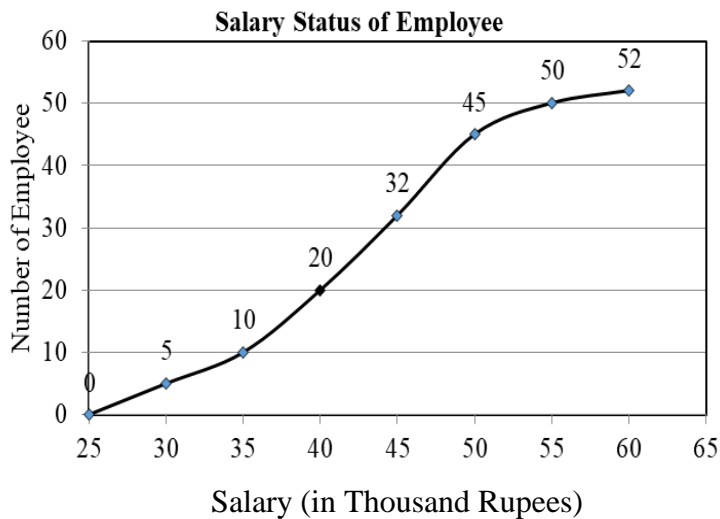
During a survey, the participants were asked about their favourite fast food. The given bar chart represents the information collected from this survey.



2. The total number of the participants that participated in the survey is
- A. 2,500
 - B. 6,600
 - C. 7,600
 - D. 8,600
3. The percentage of the most favourite fast food is
- A. 25.06%.
 - B. 29.06%.
 - C. 32.06%.
 - D. 34.06%.
4. The median of the values 1, 1, 1, 1, 2, 2, 3, 100, 101, 103 is
- A. 1
 - B. 1.5
 - C. 2
 - D. 2.5
5. The standard deviation of 1, 0, 1 and 0 is
- A. 0.25
 - B. 0.50
 - C. 1
 - D. 2
6. If the average of a , b , c and d is m , then the average of $a - x$, $b - 2x$, $c + x$ and $d + 2x$ will be
- A. m .
 - B. $m + x$.
 - C. $m - x$.
 - D. $m - 2x$.

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7. From the given cumulative frequency curve, the number of employees having salaries less than or equal to Rs 50,000 is



- A. 13
 B. 32
 C. 45
 D. 67
8. The range of the data a , 8, 11, 11, 12, 13 and b is 12. If the data is given in the ascending order, then the relation between a and b will be
- A. $a - b = 12$
 B. $b - a = 12$
 C. $b + 12 = -a$
 D. $a - 12 = -b$
9. The least common multiple (LCM) of the expressions a^{n-1} , a^n and a^{n+1} is
- A. a
 B. a^{n-1}
 C. a^n
 D. a^{n+1}
10. The highest common factor (HCF) of the expressions $\frac{(x-3)^2}{x^2 - y^2}$ and $\frac{x-y}{x^2 - 9}$ is
- A. 1
 B. $x - 3$
 C. $x - y$
 D. $\frac{x-3}{x-y}$

11. The highest common factor (HCF) of $x + a$, $x^2 + a^2$ and $x^3 + a^3$ is

- A. 1
- B. $x + a$
- C. $x - a$
- D. $x^2 + a^2$

12. On simplification of $\frac{x^2 + bx}{x^2 - b^2}$, we get

- A. $-\frac{x}{b}$
- B. $\frac{x}{x - b}$
- C. $\frac{x}{x + b}$
- D. $-\frac{x}{x - b}$

13. On simplification of $\frac{1}{4(x - 4)} - \frac{1}{2(x - 4)}$, we get

- A. $-\frac{1}{2(x - 4)}$
- B. $-\frac{1}{4(x - 4)}$
- C. $\frac{1}{4(x - 4)}$
- D. $\frac{1}{2(x - 4)}$

14. The highest common factor (HCF) and the least common multiple (LCM) of two algebraic expressions are a and $a(a - 1)(2a - 1)$ respectively.

If one of the expressions is $2a^3 - 3a^2 + a$, then the other expression will be

- A. 1
- B. a
- C. a^2
- D. $a^2(a - 1)(2a - 1)$

15. The square root of $x^4 + 64 - 16x^2$ is equal to

- A. $x^2 - 8$
- B. $x^2 - 4x$
- C. $x^2 + 8 - 4x$
- D. $(x^2 + 8)^2 - (4x)^2$

16. In the simplest form, $\sqrt{\frac{(x-2y)^3}{(x+2y)(x^2-4y^2)}}$ is equal to

- A. 1
 B. $\frac{x-2y}{x+2y}$
 C. $\frac{x-2y}{x-4y} \times \sqrt{\frac{x-2y}{x+2y}}$
 D. $(x-2y) \times \sqrt{\frac{x-2y}{(x+2y)(x^2-4y^2)}}$

17. The simplest form of the expression $\frac{(a-b)(a^2-ab+b^2)}{a^3-b^3}$ is

- A. -1
 B. 1
 C. $a-b$
 D. $\frac{a^2-ab+b^2}{a^2+ab+b^2}$

18. If $2|x|+1=15$, then the value of $|2x|$ is equal to

- A. 7
 B. 14
 C. ± 7
 D. ± 14

19. The solution set of $\frac{ax-1}{a} = \frac{1}{a}$ is

- A. $\left\{\frac{1}{a}\right\}$.
 B. $\left\{\frac{2}{a}\right\}$.
 C. $\left\{-\frac{2}{a}\right\}$.
 D. $\left\{\frac{a+1}{a}\right\}$.

20. The solution set of $a\sqrt{x}-a=0$ is

- A. $\{0\}$.
 B. $\{1\}$.
 C. $\{2\}$.
 D. $\{a\}$.

21. If two times of a number exceeds the number by 3, then the number will be

- A. -3
- B. $-\frac{3}{2}$
- C. $\frac{3}{2}$
- D. 3

22. The solution set of $|x-5|+10=5$ is

- A. $\{ \}$.
- B. $\{0\}$.
- C. $\{0,10\}$.
- D. $\{0,-10\}$.

23. The solution of $\frac{1-x}{2} < 1$ is

- A. $x > 1$
- B. $x < 1$
- C. $x < -1$
- D. $x > -1$

24. If 2 more than half of a number is 5, then the number will be

- A. 3
- B. 6
- C. 7
- D. 14

25. In the rectangular plane, the abscissa of the point $(-8, -5)$ is

- A. -8
- B. -5
- C. 5
- D. 8

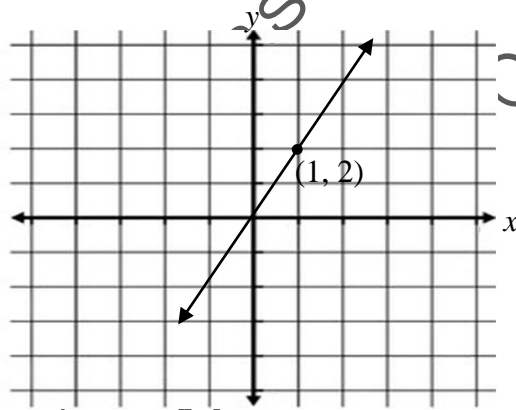
26. In the given table, the values of x and y satisfy the equation $2x - y = 2$.

x	0	p
y	q	2

What would be the value of $p - q$?

- A. 4
B. 2
C. 0
D. -2
27. As shown in the given graph, the equation of the line passing through the origin and the point $(1, 2)$ will be

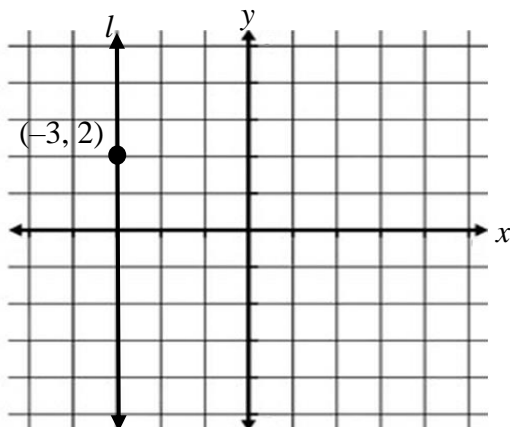
- A. $y = x$
B. $y = x + 2$
C. $y = 2x$
D. $y = 2x + 1$



28. Which of the following points lies on the line given by the equation $2x - y = 1$?

- A. $(1, 1)$
B. $(2, 1)$
C. $(2, -1)$
D. $(1, -1)$

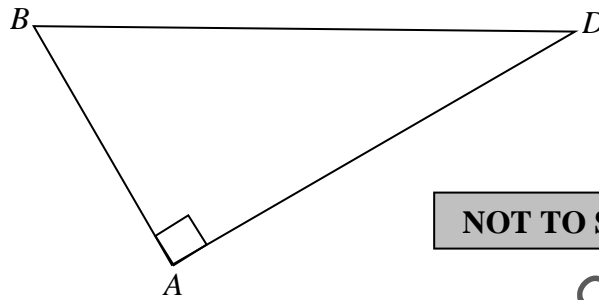
29. In the given graph, the equation of the line l is



- A. $x - 3 = 0$
 B. $x + 3 = 0$
 C. $y - 2 = 0$
 D. $y + 2 = 0$
30. In a circular sector, if the radius of the circle is half of the arc length, then the central angle subtended by the arc at the centre of the circle
- A. is 2 radians.
 B. is 0.5 radians.
 C. is 0.25 radians.
 D. cannot be determined.
31. The value of $\sec 30^\circ$ is
- A. 2
 B. $\frac{1}{2}$
 C. $\frac{\sqrt{3}}{2}$
 D. $\frac{2}{\sqrt{3}}$
32. $\frac{\sin^2 \theta + \cos^2 \theta}{1 + \tan^2 \theta}$ is equal to
- A. $\sec^2 \theta$.
 B. $\sin^2 \theta$.
 C. $\cos^2 \theta$.
 D. $\operatorname{cosec}^2 \theta$.

33. In the given figure, if $AB = 5$ cm and $AD = 12$ cm, then BD is equal to

- A. 7 cm.
- B. 13 cm.
- C. $\sqrt{119}$ cm.
- D. 17 cm.



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34. If the lengths of sides of a right angled triangle are 5 cm, 5 cm and $(a+2)$ cm, then the value of a will be

- A. $3\sqrt{2}$ cm.
- B. $7\sqrt{2}$ cm.
- C. $(5\sqrt{2} - 2)$ cm.
- D. $(5\sqrt{2} + 2)$ cm.

35. In degrees, $\left(\pi - \frac{\pi}{2}\right)$ radians is equal to

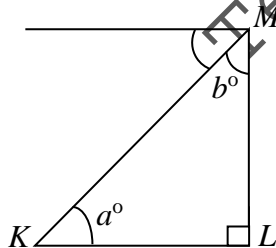
- A. 0°
- B. 45°
- C. 90°
- D. 180°

36. If the area of a circular sector is 12 units, then the value of $r^2\theta$

(Note: Symbols have their usual meaning.)

- A. is 6 square units.
- B. is 12 square units.
- C. is 24 square units.
- D. cannot be determined.

37. In the given diagram, the angle of depression subtended by point M at point K is



- A. $(a+b)^\circ$.
- B. $(a-b)^\circ$.
- C. b° .
- D. a° .

38. The angle of measurement $\frac{7\pi}{18}$ radians, in degrees, is equal to

- A. 56°
- B. 63°
- C. 70°
- D. 140°

39. The radius of a circle is 12 cm. If the length of an arc is half of its radius, then the angle subtended by the arc at the centre of the circle is

- A. 0.25 radians.
- B. 0.5 radians.
- C. 2 radians.
- D. 6 radians.

40. On simplification of $\sin \theta \times \cot \theta$, we get

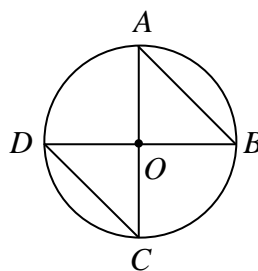
- A. $\cos \theta$.
- B. $\sec \theta$.
- C. $\operatorname{cosec} \theta$.
- D. $\frac{\sin^2 \theta}{\cos \theta}$.

41. On simplification of $\frac{\sqrt{1-\sin \theta} \times \sqrt{1+\sin \theta}}{\sqrt{1+\cos \theta} \times \sqrt{1-\cos \theta}}$, we get

- A. $\cot^2 \theta$.
- B. $\tan^2 \theta$.
- C. $\tan \theta$.
- D. $\cot \theta$.

42. In the given circle having centre O , if chord AB is equal to chord CD , then the CORRECT relation(s) between arcs is/ are

- I. $\text{Arc } AB = \text{Arc } CD$
- II. $\text{Arc } ABCD = \text{Arc } DAB$
- III. $\text{Arc } ABCD = \text{Arc } CDAB$

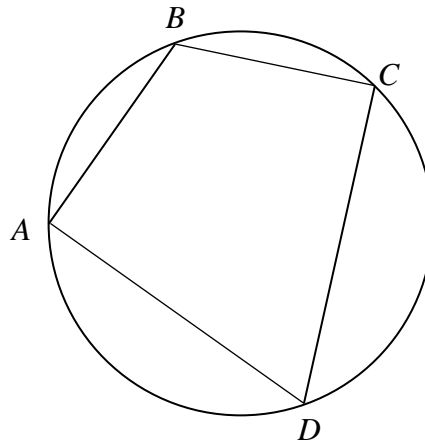


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- A. I only.
- B. II only.
- C. I and III.
- D. II and III.

43. Consider the given diagram. If $\angle C = 95^\circ$, then which of the following relations of angle is CORRECT?

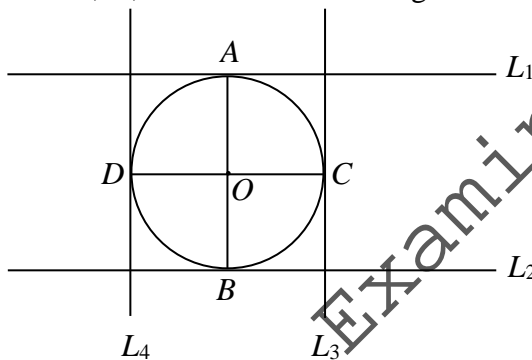
- A. $\angle A = 85^\circ$
- B. $\angle A = 95^\circ$
- C. $\angle B = 95^\circ$
- D. $\angle B = 85^\circ$



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44. Read the given information about the given diagram.

- a circle having centre at point O .
- L_1, L_2, L_3 and L_4 are four tangents to the circle at points A, B, C and D respectively.



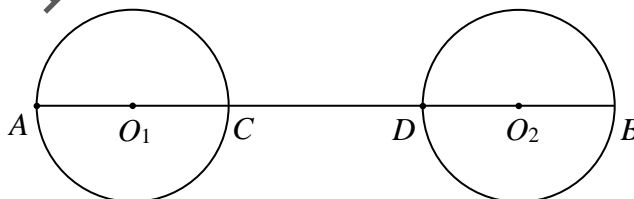
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The angle between the tangent L_1 and the line segment AB is

- A. a right angle.
- B. an obtuse angle.
- C. an acute angle.
- D. a straight angle.

45. The given diagram, shows two circles having centres O_1 and O_2 . If $AC = CD = DB$ and the radius of each circle is 3 cm, then the distance between O_1 and O_2 will be

- A. 6 cm.
- B. 9 cm.
- C. 12 cm.
- D. 18 cm.

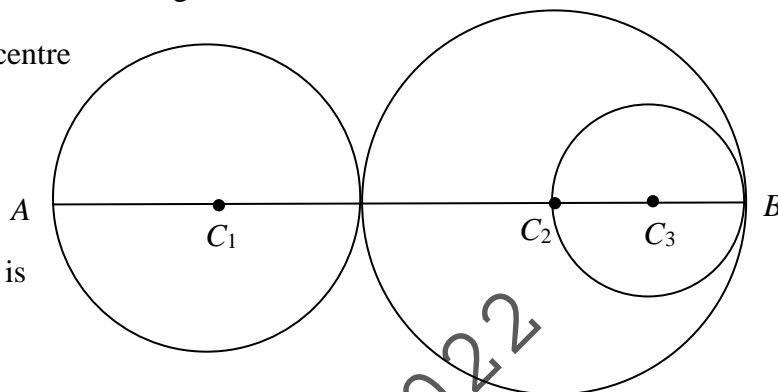


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46. The given diagram, shows three circles having centres C_1 , C_2 and C_3 .

The radius of the circle having centre

- C_1 is 3 cm.
- C_2 is 4 cm.
- C_3 is 2 cm.



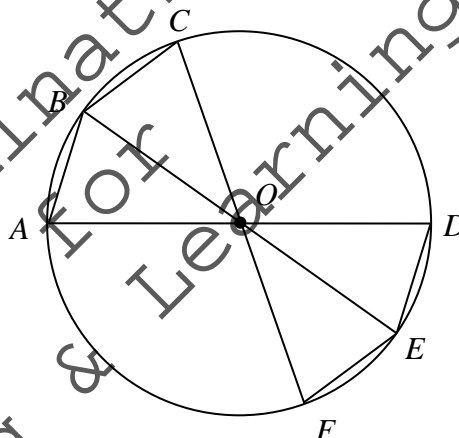
The distance between C_3 and C_2 is

- A. 1 cm.
- B. 2 cm.
- C. 3 cm.
- D. 4 cm.

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47. The given diagram shows a circle having centre at O . The chord AB and BC are congruent. If the length of chord $AB = a$ cm, then the sum of lengths of chord DE and chord EF

- A. is a cm.
- B. is $2a$ cm.
- C. is $3a$ cm.
- D. cannot be determined.

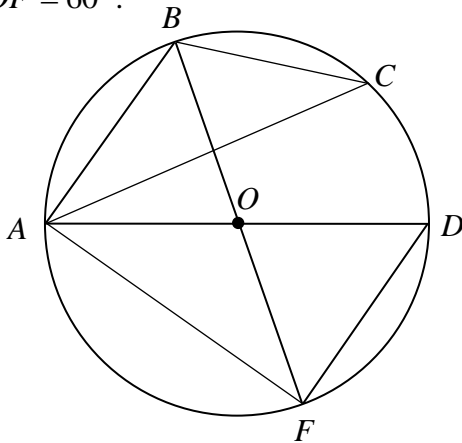


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Use the given information to answer Q.48 and Q.49.

The given diagram shows a circle having centre at point O . It is also given that $AB = DF$ and $\angle DOF = 60^\circ$.



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48. The measurement of $\angle ACB$ is

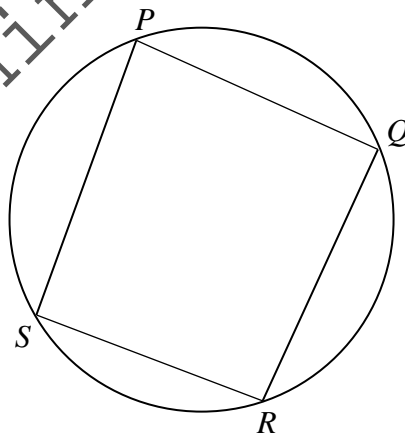
- A. 30°
- B. 45°
- C. 60°
- D. 120°

49. The measurement of $\angle AOF$ is

- A. 60°
- B. 90°
- C. 120°
- D. 150°

50. For the given quadrilateral $PQRS$ the CORRECT relation of angles is

- A. $\angle P + \angle Q = 90^\circ$
- B. $\angle R + \angle Q = 180^\circ$
- C. $\angle P + \angle R = 90^\circ$
- D. $\angle P + \angle R = 180^\circ$



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