

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X

ANNUAL EXAMINATIONS 2021

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) (C) (D)
	2 (A) (B) (C) (D)
	3 (A) (B) (C) (D)
	4 (A) (B) (C) (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.

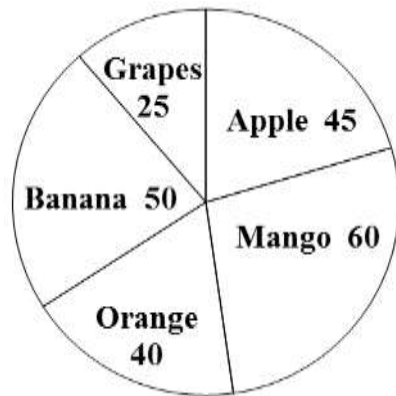
Use the given information to answer Q.1 and Q.2.

Class Interval	Frequency
50 - 59	7
60 - 69	16
70 - 79	24
80 - 89	13
90 - 99	10
Total	70

- The cumulative frequency preceding the median class will be
 - 16
 - 23
 - 24
 - 47
- The upper class boundary of the modal class is
 - 69.5
 - 70.5
 - 78.5
 - 79.5
- For five observations, if $\sum X = 9$ and $\sum X^2 = 19$, then the variance will be
 - 0.56
 - 0.20
 - 0.75
 - 2.00

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4. The given pie chart shows the number of students together with their favourite fruits in a school.



What is the percentage of the students whose favourite fruit is orange?

- A. 11.1
- B. 18.2
- C. 22.2
- D. 40.0

Use the given information to answer Q.5 and Q.6.

The given data, in ascending order, represents the ages of people who visited a shop in a day.

9, 9, 10, 15, 17, 19, 23, 27, p , p , 32, 35, 35, 35, 37, 40, 40

5. If the median is 28, then the value of p is equal to
- A. 56
 - B. 28
 - C. 18
 - D. 9
6. The mode of the data
- A. is 28
 - B. is 35
 - C. is 40
 - D. cannot be determined
7. If $\frac{X}{Y} = \frac{a}{2}$ and $\bar{X} = \frac{a}{2}$, then the value of \bar{Y} is equal to
- A. a
 - B. $\frac{a}{4}$
 - C. 0
 - D. 1

8. If $\frac{1}{a^2} \times (\text{variance of } x)$ is b , then the standard deviation of x will be

- A. $a\sqrt{b}$.
- B. \sqrt{ab} .
- C. a^2b^2 .
- D. a^4b^2 .

9. $\sqrt{(x-4)(x+4)(x^2-16)}$ is equal to

- A. $x-4$
- B. $x+4$
- C. x^2-16
- D. x^2+16

10. The least common multiple of $x^4 - a^4$, $x^2 - a^2$ and $x^2 + a^2$ is equal to

- A. 1
- B. $x^2 + a^2$
- C. $x^2 - a^2$
- D. $x^4 - a^4$

11. The highest common factor of $(y-1)^2$, $(y+1)^2$ and y^2-1 is equal to

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

12. On simplification of $\left(1 - \frac{1}{x}\right) \div \frac{1}{x}$, we get

- A. 1
- B. $x-1$
- C. $\frac{x-1}{x^2}$
- D. $\frac{1-x}{x^2}$

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13. On simplification of $2 - \frac{(a+b)^2}{(a-b)(a+b)}$, we get
- A. 1
 - B. $\frac{a+b}{a-b}$
 - C. $\frac{a+3b}{a-b}$
 - D. $\frac{a-3b}{a-b}$
14. The least common multiple of $x-1$ and $x^2 - 2x + 1$ is
- A. $(x-1)^2$.
 - B. $(x-1)^3$.
 - C. $(x-1)(x+1)$.
 - D. $(x-1)^2(x+1)$.
15. If the highest common factor of $2kx^2$ and $3x^2 - 6x$ is $3x$, then one of the values of k will be
- A. $x - 2$
 - B. x
 - C. 6
 - D. 3
16. On simplification, $\frac{1}{1-x} \div \frac{2}{x-1}$ is equal to
- A. $-\frac{1}{2}$
 - B. -2
 - C. 2
 - D. $\frac{1}{2}$
17. If $2a = 5x^2y^4$, then the square root of $\frac{5}{2a}$ is equal to
- A. $\frac{1}{x^2y^2}$
 - B. x^2y^2
 - C. $\frac{1}{xy^2}$
 - D. xy^2

18. On solving the equation $3 = -\frac{3}{2}x$, the value of x will be

- A. -2
- B. 2
- C. $\frac{9}{2}$
- D. $-\frac{1}{2}$

19. The solution of $7x - 7 > -7$ will be

- A. $x < 2$
- B. $x > -2$
- C. $x < 0$
- D. $x > 0$

20. The solution set of $|1 - x| = 0$ will be

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

21. The solution set of $\sqrt{x - \frac{1}{4}} = \frac{1}{2}$ will be

- A. $\left\{\frac{1}{4}\right\}$.
- B. $\left\{\frac{1}{2}\right\}$.
- C. $\left\{0, \frac{1}{4}\right\}$.
- D. $\left\{0, \frac{1}{2}\right\}$.

22. If $\sqrt{x} - \sqrt{k} = \sqrt{k}$, then the value of $\frac{\sqrt{x}}{2}$ is equal to

- A. 0
- B. $\frac{\sqrt{2k}}{2}$
- C. $\frac{\sqrt{k}}{2}$
- D. \sqrt{k}

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23. Which of the following inequalities satisfies the solution set $x < 1$ or $x > -1$?

- A. $|8x| < 8$
- B. $8|x| > 8$
- C. $|x| + 1 > 1$
- D. $|x| + 1 < 1$

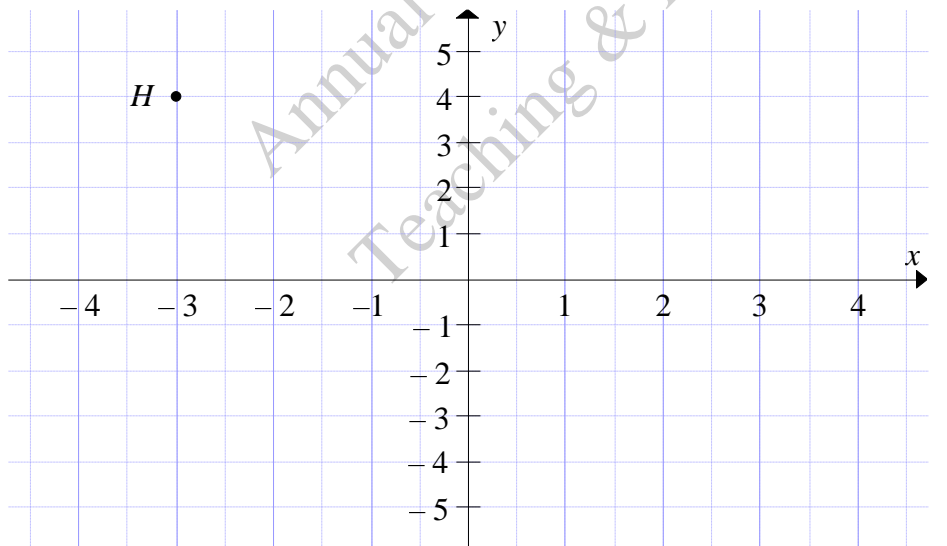
24. If $\sqrt{x} - 1 = 1$, then the value of x is equal to

- A. 0
- B. 2
- C. ± 2
- D. 4

25. For the given equations $x - 3y = 9$ and $x + 3y = 15$, the value of x will be

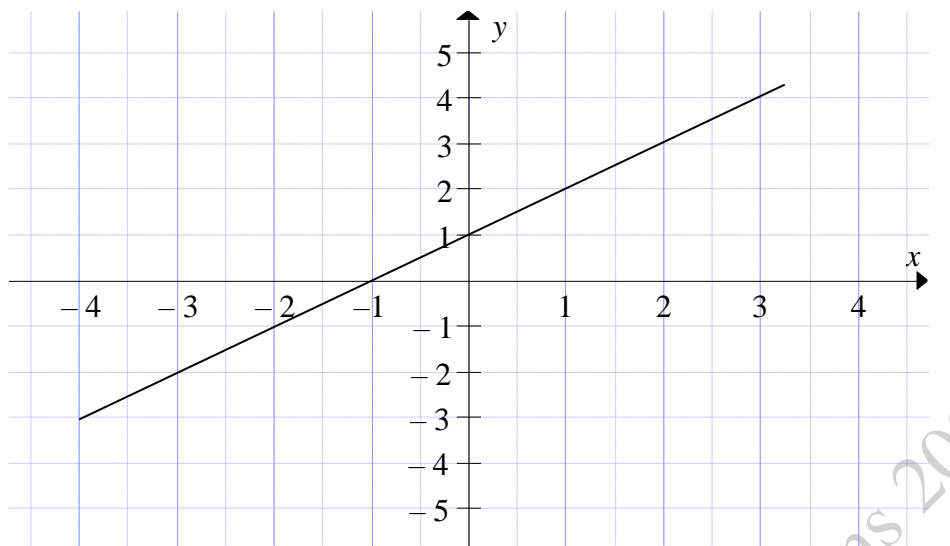
- A. -6
- B. -3
- C. 12
- D. 24

26. The coordinates of point H in the given graph is



- A. $(-3, 4)$.
- B. $(4, -3)$.
- C. $(3, -4)$.
- D. $(-3, -4)$.

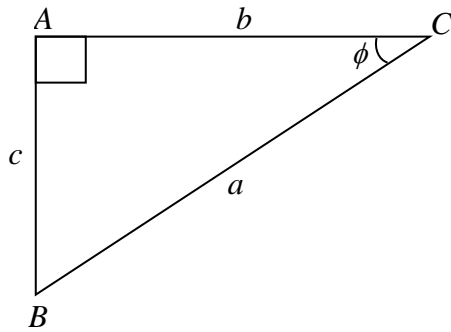
Use the given graph to answer Q.27 and Q.28.



27. One of the points that lies on the given line is
- A. (4,4).
 - B. (3,2).
 - C. (0, -1).
 - D. (-1,0).
28. If a point lies on the given line and its ordinate is -3 , then the abscissa of the point will be
- A. -3
 - B. -4
 - C. 2
 - D. 1
29. Which of the following options shows an ordered pair?
- A. $\{-1, -10\}$.
 - B. $\{(-1, -10)\}$.
 - C. $\{-1, -10\}$.
 - D. $(-1, -10)$.

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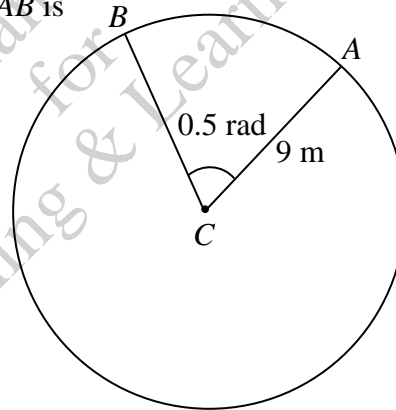
30. In the given triangle ABC , $\tan \phi$ is



- A. $\frac{a}{b}$.
 B. $\frac{b}{a}$.
 C. $\frac{b}{c}$.
 D. $\frac{c}{b}$.

31. In the given diagram, the length of arc AB is

- A. 0.025 m.
 B. 4.5 m.
 C. 18 m.
 D. 20.25 m.



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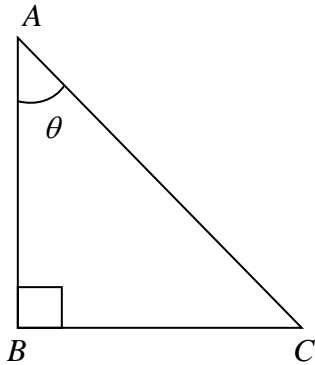
32. On simplification of $(\sec^2 \theta - 1) \cot \theta$, we get

- A. 1
 B. $\tan \theta$
 C. $\cot^3 \theta$
 D. $\sin \theta \cos \theta$

33. The value of $\operatorname{cosec}^2 45^\circ$ is

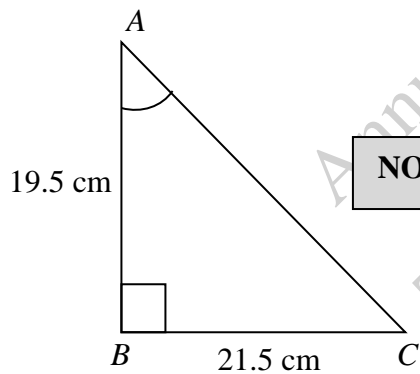
- A. 2
 B. $\frac{1}{2}$
 C. $\frac{3}{4}$
 D. $\frac{4}{3}$

34. In the given triangle ABC , $\sin \theta$ is equal to



- A. $\frac{AC}{AB}$.
- B. $\frac{AB}{AC}$.
- C. $\frac{BC}{AC}$.
- D. $\frac{AC}{BC}$.

35. In the given triangle ABC , the length of AC is



- A. 2 cm .
 - B. 3.009 cm .
 - C. 29.026 cm .
 - D. 41 cm .
36. If π radians is added to 180° , then the result, in radian, will be
- A. π
 - B. 2π
 - C. 180
 - D. 360

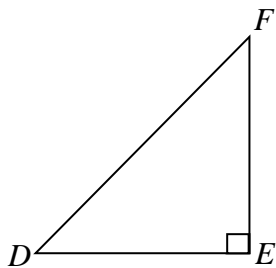
37. In a sector, if the ratio of arc length to the radius is 3 : 5, then its central angle
- A. is 2 radians.
 - B. is 0.6 radians.
 - C. is 1.67 radians.
 - D. cannot be determined.
38. If $r^2 = \frac{15}{\theta}$, then the area of sector

(Note: Symbols have their usual meaning.)

- A. is 7.5 square units.
 - B. is 15 square units.
 - C. is 30 square units.
 - D. cannot be determined.
39. The tangent of the angle is negative in
- I. second quadrant.
 - II. third quadrant.
 - III. fourth quadrant.
- A. I only
 - B. II only
 - C. I and III
 - D. II and III

40. On simplification, the expression $\sqrt{2\sec^2 \theta - 2\tan^2 \theta}$ is equal to
- A. $\sqrt{2}(\sec \theta - \tan \theta)$
 - B. $2(\sec \theta - \tan \theta)$
 - C. $\sqrt{2}$
 - D. 2

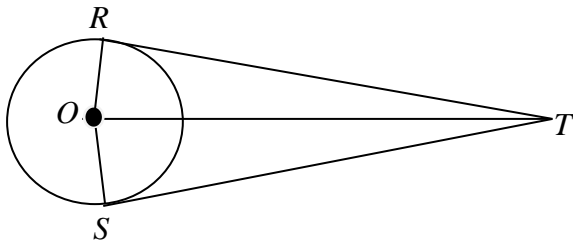
41. In the given right angled triangle DEF , if $DE = 2EF$, then the length of DF can be expressed as



- A. $DF = 3EF$
- B. $(DF)^2 = 3(DE)^2$
- C. $DF = 2DE + EF$
- D. $(DF)^2 = 4(EF)^2 + (EF)^2$

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42. In the given diagram, O is the centre of the circle and RT and ST are the two tangents drawn to the circle.

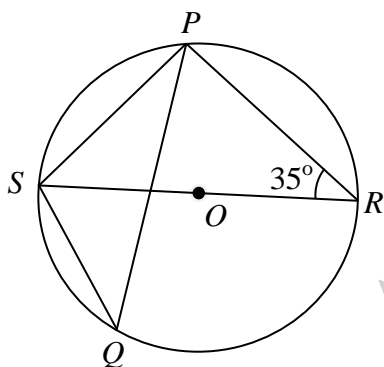


If $OR = x$ units and $OT = (2x + 1)$ units, then $(RT)^2$ is equal to

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

Use the given information to answer Q.43 and Q.44.

In the given diagram, O is the centre of the circle.



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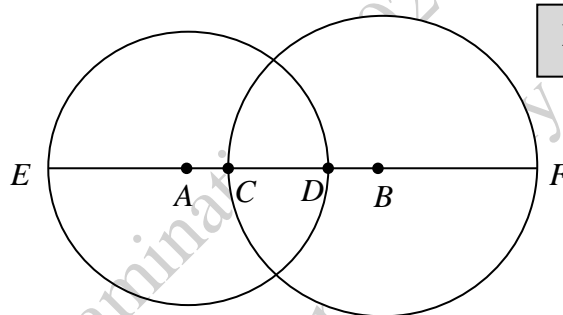
43. The value of $\angle RSP$
- A. is 35°
 - B. is 55°
 - C. is 70°
 - D. cannot be determined
44. The value of $2\angle SQP$ is equal to
- A. 70°
 - B. 110°
 - C. $2(70^\circ)$
 - D. $2(110^\circ)$

45. If two circles touch each other externally and their radii are c and b , where $c > b$, then the distance between their centres is

- A. $b - c$.
- B. $\frac{b - c}{2}$.
- C. $\frac{b + c}{2}$.
- D. $b + c$.

46. In the given diagram, A and B are the centres of the given two circles with radii of 4 cm and 5 cm respectively. If $CD = 3$ cm, then EF is equal to

- A. 6 cm.
- B. 12 cm.
- C. 15 cm.
- D. 18 cm.

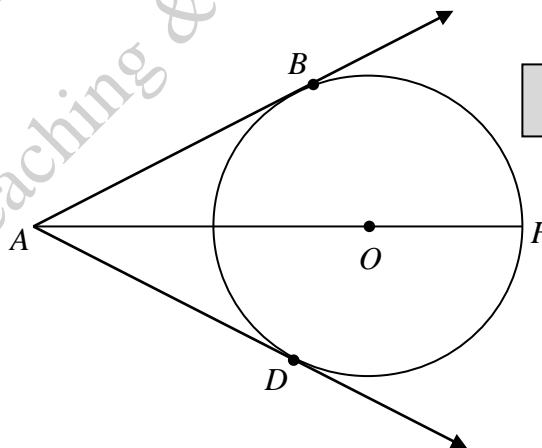


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47. In the given diagram, AB and AD are tangents to the given circle at point B and point D respectively. If O is centre of the given circle, then which of the options is TRUE?

- I. $OB = OF$
- II. $AO = AD$
- III. $AD = AB$

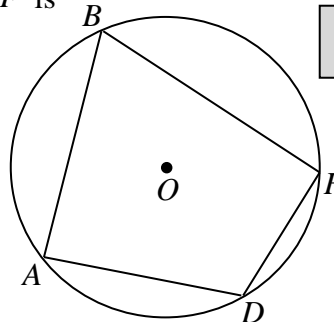
- A. I only
- B. II only
- C. I and III
- D. II and III



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48. In the given diagram, if $\angle ABF < 90^\circ$, then $\angle ADF$ is

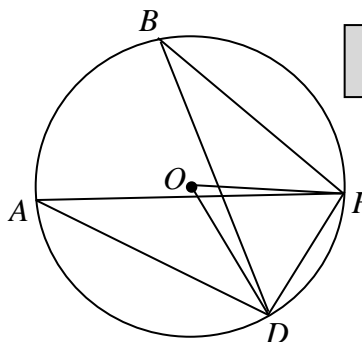
- A. less than 90°
- B. greater than 90°
- C. exactly 90°
- D. $360^\circ - \angle ABF$



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49. In the given diagram, O is the centre of the circle. If $\angle DAF = 30^\circ$, then $\angle DOF - (\angle DAF + \angle DBF)$ is equal to

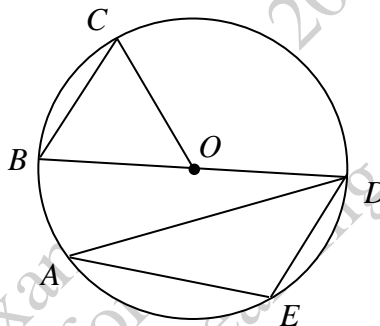
- A. 0°
- B. 30°
- C. 45°
- D. 60°



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50. In the given diagram, O is the centre of the circle. If $\angle DAE = 35^\circ$ and $DE = BC$ then $\angle BOC$ is

- A. 17.5°
- B. 35°
- C. 70°
- D. 110°



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