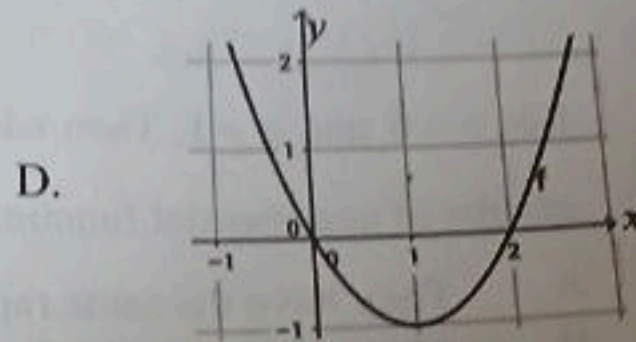
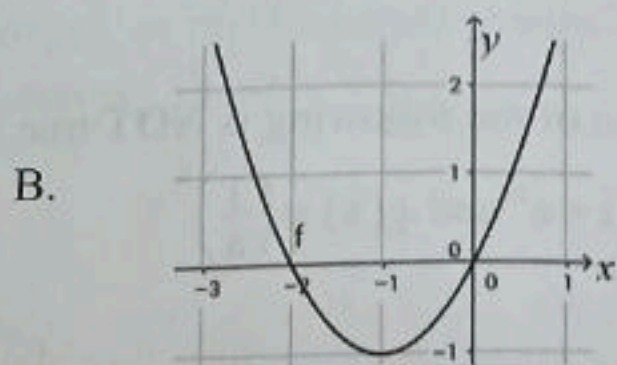
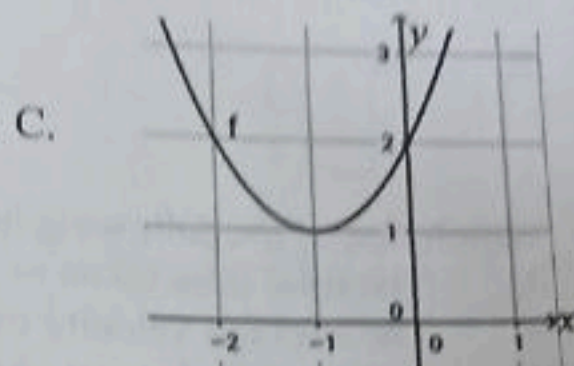
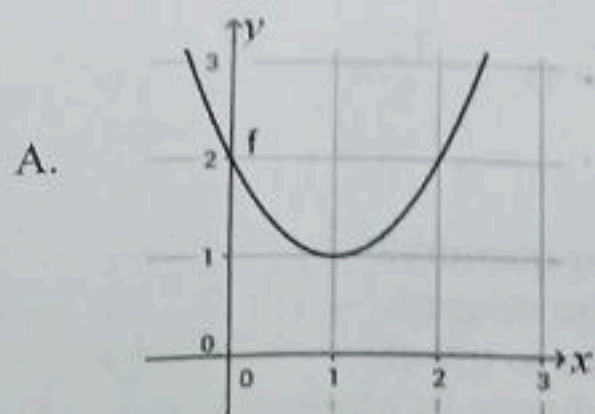




**קהל
ACADEMY**

 @Qesem_Academy

25. Which one of the following graphs represents the function $f(x) = (x-1)^2 - 1$?



26. A circle with radius 3 cm increases its radius at a rate of 0.2 cm/sec. What is the area of the circle at the 5th second?
- A. $9\pi \text{ cm}^2$ C. $16\pi \text{ cm}^2$
 B. $4\pi \text{ cm}^2$ D. $9.64\pi \text{ cm}^2$
27. A school has 6,000 students. The ratio of female students to the total number of students is 2:3. Which one of the following is true about the students in the school?
- A. About 33% of the students in the school are female.
 B. The ratio of male students to female students is 1:3.
 C. The number of male students is greater than that of female students.
 D. The number of female students is twice the number of male students.

21. Consider the following data.

12, 21, 16, 15, 10, 11, 12, 18, 9, 10, 13, 14, 15, 13, 19

Which one of the following is true?

A. $Q_1 = 12$

C. $Q_1 = 4$

B. $Q_2 = 13.5$

D. $Q_3 = 16$

22. A line ℓ_1 in the x, y -plane has equation $x - y + 3 = 0$. A second line ℓ_2 which is perpendicular to ℓ_1 contains the point $(2, 3)$. Which one of the following gives equation of ℓ_2 ?

A. $y - x - 3 = 0$

C. $y + x - 5 = 0$

B. $y - x + 5 = 0$

D. $3y + 2x + 3 = 0$

23. The following is raw data of 15 students in a test:

9, 6, 6, 10, 6, 10, 9, 7, 7, 5, 9, 7, 10, 7, 7

Which one of the following is frequency distribution of the given data?

A.

v	1	3	5	3	3
f	5	6	7	9	10

C.

v	5	6	7	8	9	10
f	1	3	5	1	3	2

B.

v	5	6	7	9	10
f	1	3	5	3	3

D.

v	5	6	7	9	10
f	5	4	3	2	1

24. When the Division Algorithm is applied to the fraction $\frac{283}{20}$, then which one of the following is the corresponding representation?

A. $283 = 14 \times 20 + 3$

C. $283 = 7 \times 20 + 143$

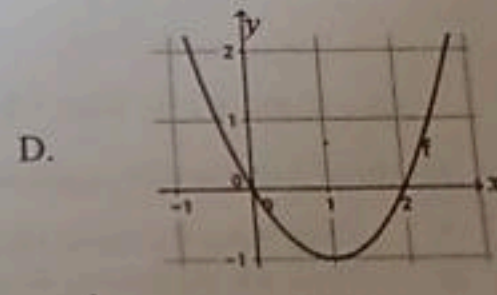
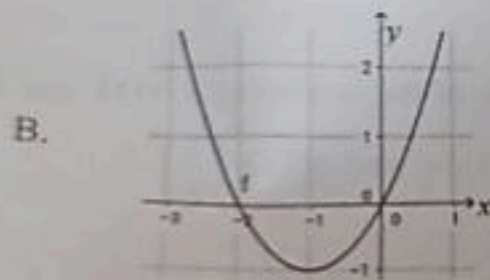
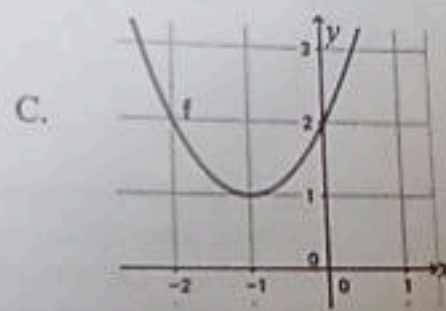
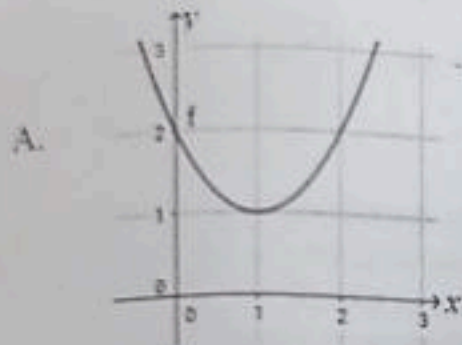
B. $283 = 1 \times 283 + 0$

D. $283 = 10 \times 20 + 83$

34. Let A(-1, 2) and B(0, 5) be initial and terminal points of vector $\overrightarrow{AB}$. What is the position vector of $\overrightarrow{AB}$?
A. $i + 3j$
B. $5j$
C. $-i - 3j$
D. $-i + 7j$
35. Which of the following describe combination of objects?
A. The number of ways of arranging n objects taking n at a time considering the order of the objects.
B. The number of ways of arranging the seat of n people in a circle.
C. The number of ways of choosing r objects from n objects disregarding the order of selection.
D. The number of ways of arrangement of n objects in a specific order using r objects at a time.
36. Which one of the following is NOT true about the coefficient of variation?
A. It is a relative measure used to measure the degree of consistency.
B. It is the ratio of standard deviation to the mean.
C. It is a measure of relative dispersion that is based on standard deviation.
D. It is used to evaluate the variation of a data.
37. If $x = 0.00471$, then which of the following gives the mantissa of $\log x$?
A. $\log 0.471$
B. 3
C. $\log 4.71$
D. -3
38. What is the domain of the function $f(x) = \sqrt{3-x^2}$?
A. $(-\infty, \sqrt{3}] \cup [\sqrt{3}, \infty)$
B. $[-\sqrt{3}, \sqrt{3}]$
C. $[-3, 3]$
D. $[\sqrt{3}, \infty)$

13. If $\sin(-53^\circ) = \beta$, then which one of the following is correct?
- A. $\sin(307^\circ) = \beta$ C. $\sin(-57^\circ) = \beta$
 B. $\sin(127^\circ) = \beta$ D. $\sin(57^\circ) = \beta$
14. The solution set of $\sqrt[3]{64^{x-1}} = \left(\frac{1}{16}\right)^{2x+3}$ is equal to:
- A. $\{1\}$ C. $\{-1\}$
 B. $\left\{\frac{1}{3}\right\}$ D. $\left\{-\frac{1}{2}\right\}$
15. Which one of the following is true about measures of dispersion?
- A. It gives the middle value of the data.
 B. It locates the central value of the data.
 C. It measures the scatter of the data.
 D. It gives representative of the whole data.
16. In how many ways can the name for vertices of a triangle be given in different order by using letters A, B, C, D, E?
- A. 60 C. 10
 B. 120 D. 20
17. What is the solution set of the inequality $1 - \frac{3}{x} \leq \frac{4}{x^2}$?
- A. $(-\infty, -1] \cup [4, \infty)$ C. $(-\infty, -1) \cup (4, \infty)$
 B. $[-1, 4]$ D. $[-1, 0) \cup (0, 4]$

25. Which one of the following graphs represents the function $f(x) = (x-1)^2 - 1$?

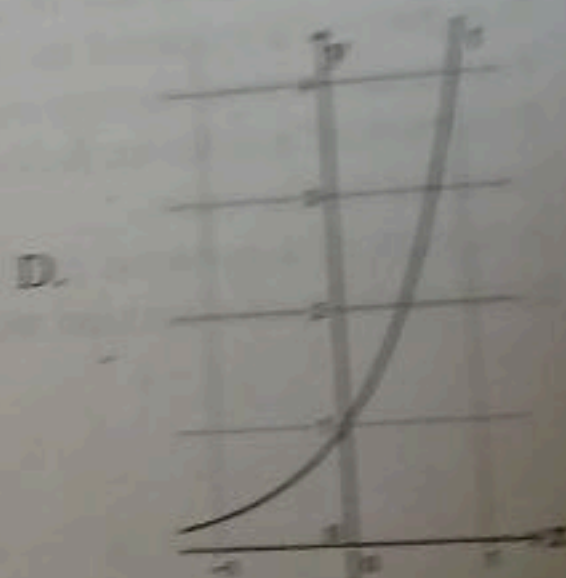
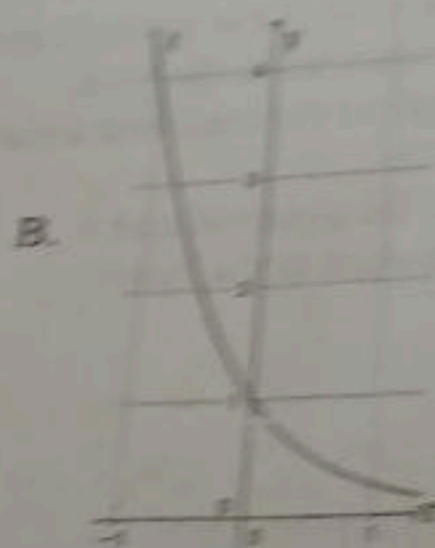
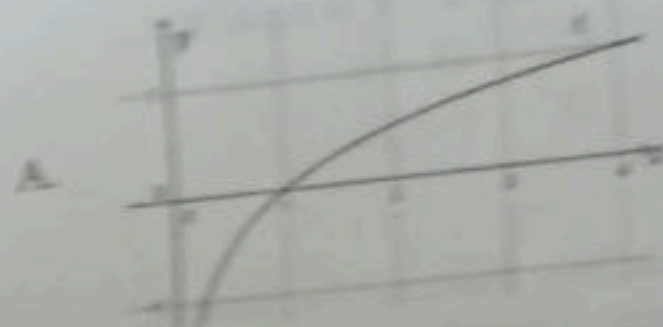


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SUBJECT CODE: 02

55. Which of the following is NOT a valid reason for a person to save money?
- A. To support life after retirement
 - B. To give loan to other people and collect profit
 - C. For down payment of a house
 - D. To buy shares from private banks

56. Which one of the following graphs represents $f(x) = \log_a x$?



57. An equilateral triangle is inscribed in a circle with radius $\sqrt{3}$ cm. Then what is the perimeter (in cm) of the triangle?

A. $3\sqrt{3}$

C. 9

B. $\frac{9}{8}\sqrt{3}$

D. $\frac{9}{2}$

39. Mr. Bekele finances two investments, I_1 and I_2 . The profits of I_1 and I_2 are 8% and 10%, respectively. The total investment is Birr one million with at least Birr 50,000 in I_1 and at most Birr 300,000 in I_2 . Which of the following is the Mathematical representation of the problem if Mr. Bekele wishes to maximize his profit? (Let x and y be the amount of money invested on I_1 and I_2 in Birr, respectively)

A. Maximize $z = 0.08x + 0.1y$
 s.t. $x + y \leq 1,000,000$
 $x \geq 50,000$
 $y \leq 300,000$
 $x, y \geq 0$

C. Maximize $z = 0.08x + 0.1y$
 s.t. $x + y \leq 1,000,000$
 $x \leq 50,000$
 $y \geq 300,000$
 $x, y \geq 0$

B. Maximize $z = 0.08x + 0.1y$
 s.t. $x + y \geq 1,000,000$
 $x \geq 50,000$
 $y \leq 300,000$
 $x, y \geq 0$

D. Maximize $z = 0.08x + 0.1y$
 s.t. $x + y \geq 1,000,000$
 $x \leq 50,000$
 $y \geq 300,000$
 $x, y \geq 0$

40. Dibabe was hired in an elementary school with a monthly salary of Birr 30,000. The agreement was to raise her salary every year by Birr 3,000. What is the total amount of money that Dibabe will earn at the end of the 8th year in Birr?

A. 324,000
 B. 3,888,000

C. 2,976,000
 D. 2,964,000

41. For what value of x is the matrix $\begin{pmatrix} 1 & 0 & 1 \\ 2x+1 & 3 & 0 \\ 1 & -1 & x \end{pmatrix}$ invertible?

A. $\{x \in \mathbb{R}: x \neq 3\}$

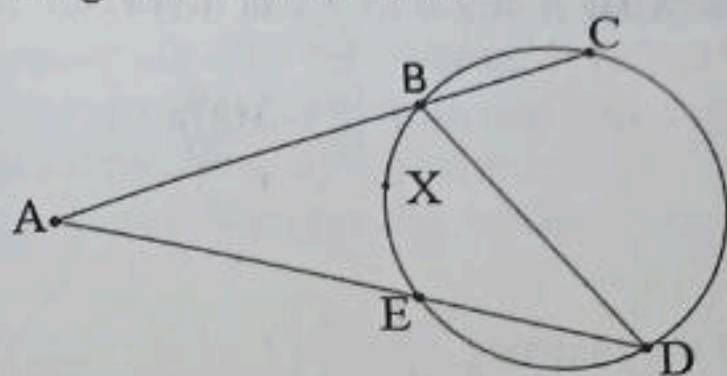
C. $\{x \in \mathbb{R}: x \neq 0\}$

B. $\{x \in \mathbb{R}: x \neq 4\}$

D. $\{x \in \mathbb{R}: x \neq -1\}$

42. What is the surface area (in cm^2) of leather material required to make a spherical shape ball of radius 25cm?
- A. 1250π
B. 2500π
C. 100π
D. 625π
43. Consider the matrix $\begin{pmatrix} 2 & -3 & 1 \\ 0 & -1 & \pi \\ 3 & 1 & 4 \end{pmatrix}$. What is the cofactor of entry π ?
- A. -7π
B. -11
C. -11π
D. 7
44. What are the maximum and minimum values respectively of $z = 3x + y$ subject to constraints $\begin{cases} 3x + 2y \leq 20 \\ 2x - y \geq 4 \\ x \geq 0, y \geq 0 \end{cases}$?
- A. 18 and 8
B. 40 and 6
C. 16 and 6
D. 20 and 6
45. When converting the recurring decimal $0.\dot{2}\dot{5}$ in to a fraction using convergent geometric series, then what are the first term and the common ratio respectively?
- A. 2.5 and 0.1
B. 25 and 0.01
C. 0.25 and 0.1
D. 0.25 and 0.01
46. Let $A = \{1, 2\}$ and $B = \{1, 3\}$ be sets. Then which one of the following Cartesian products is correct?
- A. $A \times A = \{(1, 1), (2, 2), (2, 1), (1, 2)\}$.
B. $B \times B = \{(1, 1), (1, 3), (3, 3), \{2, 3\}\}$.
C. $A \times B = \{(1, 1), (1, 3), (2, 1), (2, 3), (3, 2)\}$.
D. $B \times A = \{(1, 1), (3, 1), (1, 2), (3, 2), (2, 3)\}$.

38. What is the domain of the function $f(x) = \sqrt{3 - x^2}$?
- A. $(-\infty, \sqrt{3}] \cup [\sqrt{3}, \infty)$
- B. $[-\sqrt{3}, \sqrt{3}]$
- C. $[-3, 3]$
- D. $[\sqrt{3}, \infty)$



A. 30^0
B. 20^0

C. 60°
D. 65°

48. Let $f(x)$ be a polynomial of degree at least 1, $g(x)$ be a non-zero polynomial and $c \in \mathbb{R}$. Which of the following states the Factor Theorem?
- A. If $f(x)$ is divided by $x - c$, then the remainder is $f(c)$.
- B. For distinct real numbers a and b , if $f(a)f(b) < 0$, then $f(x)$ has at least one zero between a and b .
- C. There exist polynomials $q(x)$ and $r(x)$ such that $f(x) = g(x)q(x) + r(x)$.
- D. $f(c) = 0$ if and only if $x - c$ is a factor of $f(x)$.

49. A person, whose height is 2 m, is standing away from a 16 m tall building. The angle of depression from the top of the building to the head of the person is 30° . How far is the person from the building in meters?

A. $\frac{14}{\sqrt{3}}$

B. $\frac{16}{\sqrt{3}}$

C. $16\sqrt{3}$

D. $14\sqrt{3}$

50. Which one of the following is equal to $\sum_{k=1}^4 (2k-1)$?
- A. 32
B. 30
C. 16
D. 20
51. What is the inverse of the matrix $\begin{pmatrix} -2 & 1 \\ 0 & 3 \end{pmatrix}$?
- A. $\begin{pmatrix} -2 & 0 \\ 1 & 3 \end{pmatrix}$
B. $\frac{-1}{6} \begin{pmatrix} -2 & 1 \\ 0 & 3 \end{pmatrix}$
C. $\begin{pmatrix} -\frac{1}{2} & \frac{1}{6} \\ 0 & \frac{1}{3} \end{pmatrix}$
D. $\begin{pmatrix} 2 & -1 \\ 0 & 3 \end{pmatrix}$
52. Let S be a set given by $\{x \in \mathbb{N} : 1 < x \leq 100\}$. Then which one of the following statement is true?
- A. S is equivalent to $\{101, 102, \dots, 198\}$.
B. S is equivalent to $\{1, 2, 3, \dots, 100\}$.
C. S is equal to $\{2, 3, 4, \dots, 99\}$.
D. S is equal to $\{2, 3, 4, \dots, 99, 100\}$.
53. Given the polynomial function $p(x) = 5x^2 - x^3 - \sqrt{2}$. Then what are the degree, leading coefficient and constant term of the polynomial, function $p(x)$ respectively?
- A. 3, 1, $\sqrt{2}$
B. 3, -1, $-\sqrt{2}$
C. 2, 5, $-\sqrt{2}$
D. 3, 5, $-\sqrt{2}$
54. If a sampling interval is calculated by dividing the size of the population by the size of the sample, then which probability sampling technique is used?
- A. Cluster Sampling
B. Systematic Sampling
C. Simple Random Sampling
D. Stratified Sampling

58. The gradient of a function $f(x) = \frac{1}{x^2}$ at $x = a$, $a \neq 0$ is equal to:

A. $\frac{2}{a^3}$

C. $\frac{2}{a^2}$

B. $-\frac{2}{a^3}$

D. $-\frac{2}{a^4}$

59. If $\mathbf{u} = (1, -1)$ and $\mathbf{v} = (2, -4)$ are vectors, then $\mathbf{u} - \mathbf{v}$ is equal to:

A. $(1, -3)$

C. $(3, -5)$

B. $(-3, 5)$

D. $(-1, 3)$

60. Which of the following statements defines frustum of a pyramid?

A. It is a surface in space all points of which are equidistant from a point.

B. It is part of a pyramid included between the base of the pyramid and a horizontal cross-section made by the plane parallel to the base.

C. It is part of a cone included between the base of the cone and a plane parallel to the base.

D. It is part of a pyramid excluded the base of the pyramid and a horizontal cross-section made by the plane slant to the base.

THE END