EST I – Math with Calculator

Date	03 June 2022
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Duration: 55 minutes

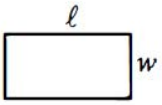
38 Multiple Choice Questions

Instructions:

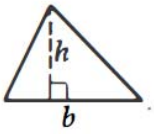
- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculator is allowed. When a calculator is used, be aware of switching between radian mode and median mode.
- Formula sheet is available on the next page of the booklet for your reference.

Reference:

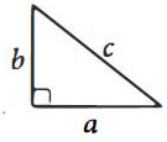
$A = \pi r^2$
$C = 2\pi r$



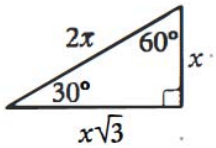
$A = \ell w$

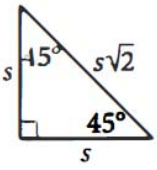


$A = \frac{1}{2}bh$

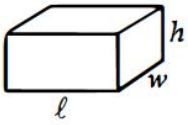


$c^2 = a^2 + b^2$

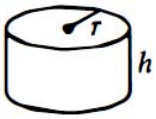




Special Right Triangles



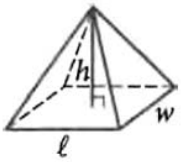
$V = \ell wh$



$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

1. Given the two inequalities $3x + 1 \geq 8$ and $4x - 1 < 3(x + 3)$, what is the greatest possible integer for x?

A. 2
B. 3
C. 9
D. 10

2. In the xy-plane, line (m) passes through the point $(2, 5)$ and is perpendicular to the line (n) that passes through the points $(4, 7)$ and $(-2, 3)$. Which of the following represents the equation of line (m)?

A. $y = -\frac{3}{2}x + 8$

B. $y = -\frac{3}{2}x - 8$

C. $y = 2x + 1$

D. $y = -\frac{2}{3}x + \frac{19}{3}$

Questions 3-4-5 refer to the information below.

A company for renting cars published on their website a summary of the amount they won during the past few years from renting cars and trucks.

Year	Amount won in $ for renting cars	Amount won in $ for renting trucks
2015	10004.6	7888.3
2016	12456.7	7985.2
2017	14899.9	8050.2
2018	13899.5	9000.5
2019	12003.4	8599.4
2020	13990.1	7995.5

3. What is the sum of the averages of the amounts won for renting cars and trucks during years 2017 to 2020?

A. \$8411.4
B. \$13698.225
C. \$22109.625
D. \$25678.725

4. What is the percentage increase of the amount won for renting trucks from 2015 to 2017?

A. 1.62%
B. 2.01%
C. 2.05%
D. 48.93%

5. This company has only one employee who works for \$1650 per month. In which year was this company unable to pay his full wage from the amount won from renting cars and trucks?

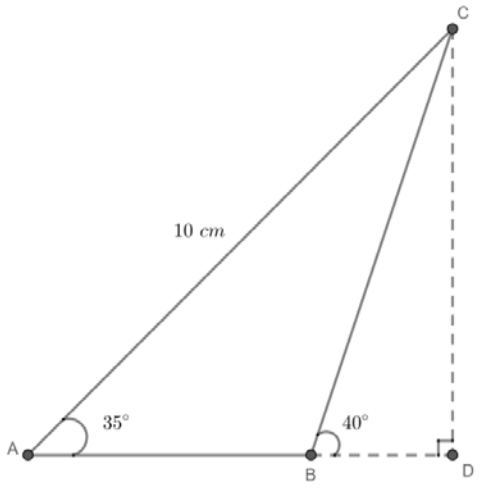
A. 2015
B. 2016
C. 2019
D. 2020

6. Amina has a bag of 6 black balls and 4 green balls. Hamad has a bag of 3 black balls and 5 green balls. If one ball is drawn from each bag, what is the probability that one is black and one is green?

A. 0.225
B. 0.25
C. 0.475
D. 0.525

7. Which of the following ordered pairs satisfy both inequalities: $x + 3y \leq 8$ and $2x - y > 9$?

A. $(0, 3)$
B. $(1, 2)$
C. $(1, -2)$
D. $(1, -9)$



8. In the figure above, triangle BDC is right angled at D with $m\angle CBD = 40°$. Given that $m\angle CAB = 35°$, and $AC = 10\,cm$, what is the length of segment AB? *(figure not drawn to scale)*

A. $1.36\,cm$
B. $5.74\,cm$
C. $6.84\,cm$
D. $8.19\,cm$

9. During the final game of UEFA Euro 2020 between Italy and England, 67,173 fans attended the game in Wembley Stadium in London, England. Assuming that the ratio of adults to children who attended the game was approximately 13 to 6, which of the following numbers represents approximately the number of children who attended the game live in the stadium?

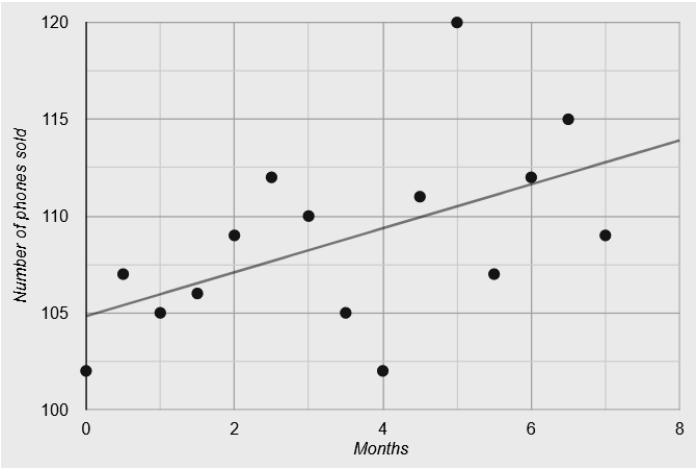
A. 21213
B. 31002
C. 36170
D. 45960

10. What is the solution for x in $2 = \sqrt{2x - 3}$?

A. 2.5
B. 3.5
C. 4.5
D. 0.5

Questions 11-12 refer to the information below.

The scatterplot below shows how many phones were sold by a company during a period of 7 months. The line of best fit represented in the scatterplot passes through points $(0, 105)$ and $(7, 112.7)$.



11. Giving that abscissa "0" signifies the beginning of the month of January, which of the following statements is/are true?

I. The largest increase in the number of phones sold was between the beginning of May and the beginning of June.

II. Most of the phones were sold in the first quarter of the year.

III. The number of phones sold in mid-January is equivalent to the number of phones sold in mid-June.

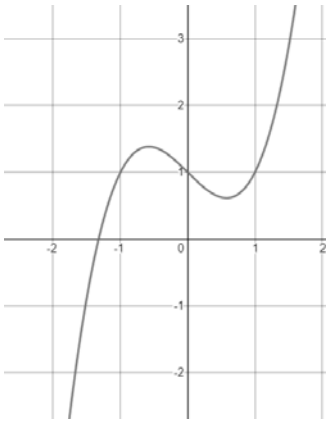
A. I only
B. I and II
C. I and III
D. II and III

12. What is the average increase in the number of phones sold?

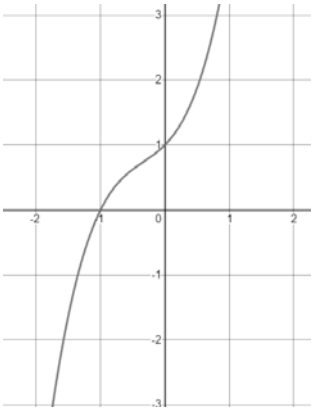
A. 0.8
B. 0.9
C. 1
D. 1.1

13. Which of the following represents the graph of the function $f(x) = x^3 + x + 1$?

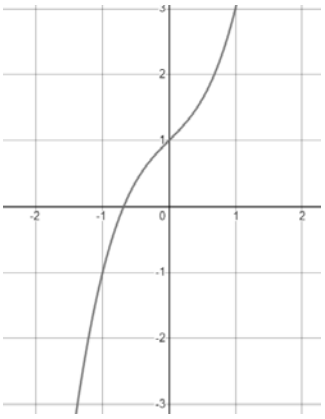
A.



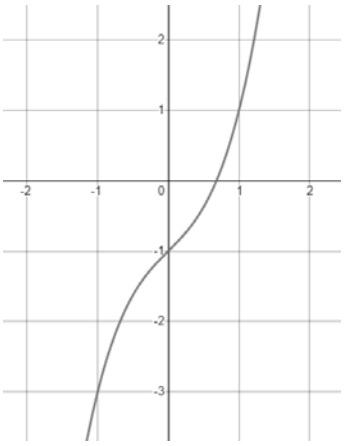
B.



C.



D.



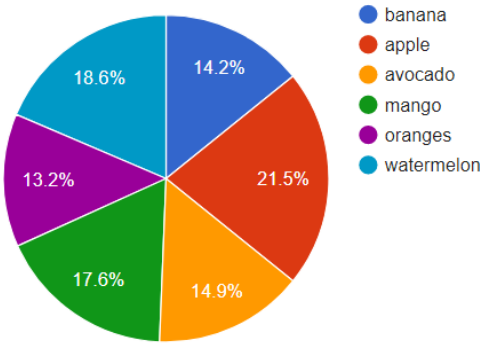
14. What is the range R of the function $f(x) = \frac{2}{x+2}$?

A. $R = (-\infty, 0]\ U\ [0, +\infty)$

B. $R = (-\infty, 0)\ U\ (0, +\infty)$

C. $R = (-\infty, -2)\ U\ (-2, +\infty)$

D. $R = (-\infty, -2]\ U\ [2, +\infty)$



15. The pie chart above shows the results of a survey that asked 1420 students in a school about their favorite fruit. How many students like mango more than any other fruit? And, approximately how many more students said apple was their favorite fruit than said oranges was their favorite one?

A. 250 students like mango, and 110 students said apple was their favorite fruit more than said orange was their favorite one.

B. 250 students like mango, and 118 students said apple was their favorite fruit more than said orange was their favorite one.

C. 306 students like mango, and 63 students said apple was their favorite fruit more than said orange was their favorite one.

D. 187 students like mango, and 56 students said apple was their favorite fruit more than said orange was their favorite one.

16. Citrus trees are fruit trees that require wet roots. These trees need a careful attention summarized by an excellent drainage and sandy soil. Adnan has a land in a village in Egypt. He decided to start a project of planting 205 citrus trees in it and getting a farmer to manage the land. He got each tree for 172 EGP, and the farmer asked for 100 EGP to plant each tree, in addition of 3994 EGP per month to manage the land and the drainage. How much will Adnan pay during the first year of his project?

A. 103,688 EGP
B. 100,388 EGP
C. 83,288 EGP
D. 59,754 EGP

17. Santa Clara County is the 6th most populous county in California, United States of America, with 1.928 million people were living there in 2019. If this number was decreased by 7% the next year due to people who died or left this county, and 4% of year 2020's population was added again in the population of year 2021 due to newborns or newcomers to the county, how many people are in this county in 2021?

A. 1,734,229
B. 1,793,040
C. 1,864,762
D. 1,939,353

18. Shahira and Nicole went to the supermarket to buy chocolate. The list of what they bought and the total price paid can be seen in the table below.

	Number of chocolates bought from brand "A"	**Number of chocolates bought from brand "B"**	**Total price paid (in $)**
Shahira	7	3	25.4
Nicole	4	5	24.7

If you went to the same supermarket and bought 1 chocolate from brand "A" and 3 chocolates from brand "B", how much will you pay?

A. $5.4
B. $7.5
C. $10
D. $11.6

19. If $f(x) = 3x - 4(2x + 7)$ and $g(x) = 4(-2x + 1)$, what is the value of $\frac{f(-1)}{g(3)}$?

A. $-\frac{43}{4}$
B. $-\frac{23}{20}$
C. $\frac{23}{20}$
D. $\frac{43}{4}$

20. Fares decided to sell his 450 books. 22% of the books are new, and the rest are considered old. If each new book will be sold for $11, and each old book will be sold for $6.5, how much will Fares get from selling his books?

A. $4504.5
B. $3370.5
C. $2281.5
D. $1089

21. Which of the following is a factor of the polynomial: $2x^3 + 13x^2 + 5x - 6$?

A. $x - 1$
B. $x - 6$
C. $2x + 1$
D. $2x - 1$

22. Karim drove his car from his village to the city. It took him 2.5 hours to reach the city driving at a constant speed of $60\,km$ per hour. Approximately, how much will he save time if he starts driving at a constant speed of $70\,km$ per hour?

A. 0.357 hours
B. 0.765 hours
C. 1.544 hours
D. 2.143 hours

23. A store did a sale on a pair of shoes. It is now for \$103.5 instead of \$230. What is the percent discount?

A. 50%
B. 45%
C. 55%
D. 58%

24. Which of the following equations represents the graph of a quadratic function that passes through points $(2, 5)$, $(3, 0)$, and $(-4, 0)$?

A. $y = -\frac{5}{6}x^2 + \frac{5}{6}x + 10$
B. $y = -\frac{5}{6}x^2 - \frac{5}{6}x + 10$
C. $y = \frac{5}{6}x^2 + \frac{5}{6}x + 10$
D. $y = \frac{5}{6}x^2 - \frac{5}{6}x + 10$

25. Given that $h(t) = \frac{2t+1}{5t^2}$ $(t \neq 0)$, what is the negative value of t if $h(t) = 3$?

A. -0.5
B. -0.4
C. -0.3
D. -0.2

26. What is the sum of the values of the x and y-intercepts of the graph of the function $f(x) = 2x + 3(x - 5)$?

A. -18
B. -12
C. 12
D. 18

27. $\begin{cases} dx - 2my = -14 \\ 3dx + 6my = 78 \end{cases}$
(d and m are constants)
Given that the solution of the system above is $(2, 5)$, what is the value of $2mx - 3dy$?

A. -37
B. -18
C. 11
D. 20

28. Patrick is twice as old as Alonso. Alonso is 7 years older than Fatima, and Fatima is 2 years younger than Patricia. If Patricia's age to Salma's age is 4 to 3, what is the age of Patrick if Salma is 12 years old?

A. 16 years old
B. 21 years old
C. 42 years old
D. 48 years old

29. $k + 2\,;\, 2k + 4\,;\, 2k + 5\,;\, 3k + 5$
The average of the list above is 36. Find k.

A. 144
B. 18
C. 16
D. 2

30. The sum of three numbers is equivalent to the product of the third number and half the difference of the first two numbers. Assuming that the first number is a, the second number is b, and the third number is c, which of the following statements represents a in terms of b and c?

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

31. 30% of a number is 86.4% of 50. What is this number?

A. 144
B. 17.36
C. 1440
D. 92

32. If $h(x) = 2x - 3g(x)$, and $g(x) = 3x + 7$, what is the value of $h(-4)$?

a. -5
b. -23
c. 7
d. 23

33. T and T' are two triangles. T is a right isosceles triangle of hypotenuse $9\sqrt{2}$, and the T' is a $30° - 60° - 90°$ triangle, such that the small leg is equivalent to 4. What is the sum of the perimeters of both triangles? (Give your answer to the nearest tenth)

a. 49.7
b. 34.5
c. 54.4
d. 38.5

34. $\begin{cases} -2x + y = 1 \\ ax + y = 4 \\ -4x = -y + 1 \end{cases}$ (a is a positive constant)
The sum of the abscissas of the intersections of the lines of the three equations in the system above is 1.6. What is the value of a?

a. 0.5
b. 1
c. 1.5
d. 2

35. 17 is subtracted from triple the sum of all integers from 1 to 44. What is the result?

a. 973
b. 939
c. 5923
d. 2953

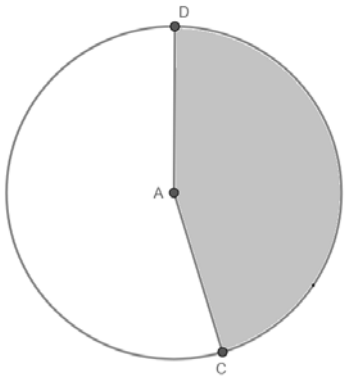
36. If the distance between points $A(3, c)$ and $B(9, -5)$ in a coordinate system is $3\sqrt{13}$, and A is a point in the first quadrant, what is the value of $\frac{c}{2} + 7$?

A. 0
B. 4
C. 9
D. 11

37. The arithmetic mean of the set below is 7.25. What is the median of this set?

$n + 4 \; ; 6 \; ; 11 \; ; 2n - 1$

A. 6
B. 7
C. 6.5
D. 8.5



38. Sami has a circular land of a radius $6\ m$. He decided to cultivate a part of this land, which is shown shaded in the figure above. Each $1\ m^2$ will cost him 79 EGP. Knowing that $m\angle DAC = 155°$, how much will Sami pay to cultivate the desired area? (Give your answer to the nearest ones)

A. 3,847 EGP
B. 220,410 EGP
C. 20,752 EGP
D. 5,248 EGP