

## 40+ EmSAT Math Sample Questions with Answer Keys 2022 – 2023

EmSAT Math practice test helps students to understand the test structure and have real-time experience with the test. Test includes questions from most of the topics which are commonly tested on the actual EmSAT math exam.

Answer keys provided at the end of the test helps you to do self-correction and plan your studies according to the topics which are difficult.

Proper Choice provides a complete [preparation course for the EmSAT Math](#), if you need any help in preparing for the exam you can contact us for further details

This practice test includes 40 questions. You can keep a self-timer of 90 minutes and try to do the test in specified time

**1. What are three positive consecutive integers when product of the first and second is 2 more than 9 times the third?**

- A. 8, 9, 10
- B. 9, 10, 11
- C. 10, 11, 12
- D. 11, 12, 13

**2. If  $16 + 4x$  is 10 more than 14, what is the value of  $8x$ ?**

- A) 2
- B) 6
- C) 16
- D) 80

**3. 9 times the difference of  $3a$  and  $b$  is**

- A.  $9 \times 3a - b$
- B.  $9(3a - b)$

C.  $\frac{3a-b}{9}$

D.  $27a - b$

4. The expression below is undefined for which of the value(s) of  $x$ ?

$$\frac{-11xy + 15x^2}{x + 3}$$

A.  $-3$

B.  $0$

C.  $1$

D.  $3$

$$h = -4.9t^2 + 25t$$

5. The equation above expresses the approximate height  $h$ , in meters, of a ball  $t$  seconds after it is launched vertically upward from the ground with an initial velocity of 25 meters per second. After approximately how many seconds will the ball hit the ground?

A)  $3.5$

B)  $4.0$

C)  $4.5$

D)  $5.0$

6. Factor completely

$$9x^5 - 30x^4 + 25x^3$$

A.  $9x^2(3x + 25)$

B.  $9x^3(x^2 - 21x + 16)$

C.  $x^3(3x - 5)^2$

D.  $4x^2$

7. The coordinate points  $(2, 5)$ ,  $(5, b)$ , and  $(10, 34)$  are on the same line. What is the value of  $b$ ?

- A. 17
- B. 18
- C. 19
- D. 20

**8. Abdullah wants to be a part of school football team. The criteria for selection is that height (h) must be greater than 150 cm and no more than 180 cm. Which of the following inequality represents this relation?**

- A.  $150 \text{ cm} \leq h < 180 \text{ cm}$
- B.  $150 \text{ cm} \leq h \leq 180 \text{ cm}$
- C.  $150 \text{ cm} < h < 180 \text{ cm}$
- D.  $150 \text{ cm} < h \leq 180 \text{ cm}$

**9.  $2x + 3 < -x + 9$ , what is possible value of x?**

- A. -2
- B. 2
- C. 4
- D. 6

**10. In the system of equation below, if  $y > 0$ , what is the solution to the equation?**

$$\begin{aligned} 2x - y^2 &= 3 \\ -3x + 2y^2 &= -1 \end{aligned}$$

- A.  $(-5, \sqrt{7})$
- B.  $(-5, -\sqrt{7})$
- C.  $(5, -\sqrt{7})$
- D.  $(5, \sqrt{7})$

**11. In the system of linear equation below, what is the value of  $3m + n$ ?**

$$\begin{aligned} 5m - n &= 11 \\ 2m - 2n &= 9 \end{aligned}$$

- A. -2

- B. 0
- C. 2
- D. 4

12. The product of complex number  $-5 + \sqrt{7}i$  and its conjugate is?

- A. 32
- B.  $-32$
- C. 23
- D.  $-23$

13. Convert the complex number shown below to polar form

$$5 + 4i$$

- A.  $6.4(\cos 38.65^\circ + i \sin 38.65^\circ)$
- B.  $6.4(\sin 38.65^\circ + i \cos 38.65^\circ)$
- C.  $5(\cos 40^\circ + i \sin 40^\circ)$
- D.  $5(\sin 40^\circ + i \cos 40^\circ)$

14. Simplify:  $x^3 \cdot x^{-7} \cdot x$

- A.  $x^{-3}$
- B.  $x^{11}$
- C.  $\frac{1}{x^{-3}}$
- D.  $\frac{1}{x^3}$

15. Simplify the expression  $\frac{27a^3}{b^5} \times \frac{(9a^{-3}b^5)^{-1}}{a^5 b^{-3}}$

- A.  $\frac{3a}{b^7}$
- B.  $\frac{243b^5}{a^5b^2}$
- C.  $\frac{3a^{-3}}{b^{-5}}$
- D.  $\frac{243a}{b^7}$

**16. Use the function f below to answer the question that follows.**

$$f(x) = x^2 - 2x - 24$$

If  $f(x + 3) = x^2 + kx - 21$ , what is the value of k?

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

**17. If  $f(x) = 2x$  and  $g(x) = x^3$ , what is  $(f \circ g)(-3)$  ?**

- A. -6
- B. -27
- C. 54
- D. -54

**18. If  $f^{-1}(x) = \frac{5x-8}{3}$ , which of the following is the function f(x)?**

- A.  $f(x) = \frac{3x+8}{5}$
- B.  $f(x) = \frac{8-3x}{5}$
- C.  $f(x) = \frac{5}{3x+8}$
- D.  $f(x) = \frac{5x-3}{8}$

**19. What is the domain for the function shown below?**

$$f(x) = 2x^2 + 2$$

- A.  $(-\infty, \infty)$
- B.  $(-\infty, 2]$
- C.  $[-2, \infty)$
- D.  $(-\infty, 2] \cup [-2, \infty)$

**20. Which of the following function is diversing?**

- A.  $f(x) = \frac{2x+10}{x^2}$
- B.  $f(x) = x^2 + 2$
- C.  $f(x) = \frac{3x+10}{x}$
- D.  $f(x) = \frac{4}{x^4}$

**21. Find the angle between vectors u and v (Round your answer to nearest integer)**

$$U = 6i + 2j \text{ and } V = -4i + 3j$$

- A.  $124^\circ$
- B.  $125^\circ$
- C.  $126^\circ$
- D.  $127^\circ$

**22. What is the tenth term of geometric sequence 4, – 12, 36, .....?**

- A. – 120
- B. 236,196

C. – 78,732

D. – 59,045

**23. If  $x = 7$ ,  $\log_2(x + 2) + \log_2 3$  is equal to?**

A.  $\log_2 12$

B.  $\log_2 27$

C.  $\log_2 30$

D.  $\log_2 37$

**24. What is the value of  $x$ , if  $\ln x + \ln 4 = \ln 8$**

A. 2

B. 3

C. 4

D. 5

**25. An observer standing 50 meters away from a building notices a flagpole on the top of the building. If the angle of elevation to the base of the flagpole is  $46.2^\circ$  and the angle of elevation to the top of the flagpole is  $50.1^\circ$ , what is the height of the flagpole?**

A. 2.3 m

B. 2.5 m

C. 59.8 m

D. 7.7 m

**26. In a right triangle, one angle measures  $x^\circ$ , where  $\sin x^\circ = \frac{3}{5}$ . What is  $\cos(\frac{\pi}{2} - x^\circ)$ ?**

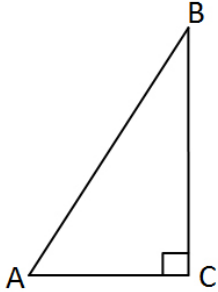
A.  $\frac{4}{5}$

B.  $\frac{3}{4}$

C.  $\frac{3}{5}$

D.  $\frac{4}{3}$

27. Angle C is a right angle in the triangle shown below.



Which statement must be true?

- A.  $\sin A = \tan B$
- B.  $\cos A = \sin B$
- C.  $\sin A = \sin B$
- D.  $\cos A = \tan B$

28. Find the exact value of  $\csc(-420^\circ)$

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

29.

Find  $\lim_{x \rightarrow \infty} \frac{-3x^{10} - 70x^5 + x^3}{33x^{10} + 200x^8 - 1000x^4}$

A.  $\frac{-1}{3}$



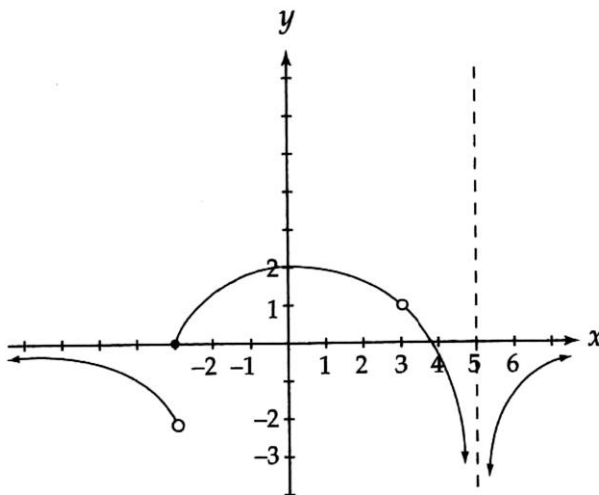
- B.  $\frac{-1}{11}$
- C.  $-3$
- D.  $\frac{-1}{33}$

30. Which of the following statements is/are true about the function?

$$f(x) = \begin{cases} x + 1, & x < 2 \\ x^2, & x = 2 \\ 2x - 1, & x > 2 \end{cases}$$

1.  $\lim_{x \rightarrow 2} f(x)$  exist
  2.  $f(2)$  exist
  3.  $f(x)$  is continuous at  $x = 2$
- A. 1 only
  - B. 1 and 2 only
  - C. 2 and 3 only
  - D. 2 only

31. The graph of the function  $f$  is shown below.



Identify the number of values of  $x$  in the open interval  $(-\infty, \infty)$  where  $f$  is discontinuous.

- A. One

- B. Two
- C. Three
- D. Four

**32. A circular pool of water is expanding at the rate of  $16\pi$  in.<sup>2</sup>/sec. At what rate is the radius expanding when the radius is 4 inches?**

- A. 2
- B. 4
- C. 6
- D. 8

**33. If the position of a particle at time  $t$  is given by the equation  $x(t) = t^3 - 11t^2 + 24t$ , find the acceleration of the particle at time  $t = 5$ .**

- A. - 11
- B. 0
- C. 8
- D. 11

**34. Find the Derivative of  $\ln(\sin x)$ .**

- A.  $\cos x$
- B.  $\sec x$
- C.  $\tan x$
- D.  $\cot x$

**35. Find the derivative of  $3x^2 - 4y^2 + y = 9$  at (2, 1)**

- A.  $\frac{-12}{7}$
- B.  $\frac{12}{7}$
- C.  $\frac{-12}{8}$
- D.  $\frac{12}{8}$

**36. If  $f(x) = \frac{1}{x^2}$ , then  $f''(x)$  ?**

A.  $\frac{6}{x^4}$

B.  $\frac{2}{x^3}$

C.  $\frac{-6}{x^4}$

D.  $\frac{-2}{x^3}$

**37. What is the area between the curve  $y = -x^2 + 4$  and the  $x$  – axis? (Round your answer to nearest integer)**

A. – 11

B. 10.66

C. 11

D. 12

**38. If  $\frac{dy}{dx} = 3x^2y$  and  $y(0) = 2$ , find an equation for  $y$  in terms of  $x$ .**

A.  $y = x^3 + 2$

B.  $y = \ln x^3 + 2$

C.  $y = e^{x^3} + 2$

D.  $y = 2e^{x^3}$

**39. If  $A = 3i - 4j$  and  $B = 5i + 2j$ , find the dot product.**

A. 6

B. 7

C. 8

D. 9

**40. Simplify**

$$-7(-a^3 + 5 - 2b^2)$$

A.  $-7a^3 + 5 - 2b^2$

- B.  $7a^3 + 35 - 14b^2$
- C.  $7a^3 - 35 + 14b^2$
- D.  $14a^3b^2 - 35$

**41. Find the horizontal asymptote of the function below**

$$\frac{2x + 3}{x^2 + 1}$$

- A.  $y = 2$
- B.  $y = 0$
- C.  $y = 5$
- D. No horizontal asymptote

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**Answer Keys**

1. C
2. C
3. B
4. A
5. D
6. C
7. C
8. D
9. A
10. D
11. C
12. A
13. A
14. D
15. A
16. D
17. D
18. A
19. A
20. B
21. B
22. C
23. B
24. A
25. D
26. C
27. B
28. A
29. B
30. B
31. C
32. A
33. C
34. D

- 35. B
- 36. A
- 37. C
- 38. D
- 39. B
- 40. C
- 41. B

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