

## 2021 WASSCE ELECTIVE MATHS PAPER 1

1.

Simplify  $\left(\frac{1}{2-\sqrt{3}} + \frac{2}{2+\sqrt{3}}\right)^{-1}$

- A.  $\frac{-1}{33}(6 + \sqrt{3})$
- B.  $\frac{-1}{33}(6 - \sqrt{3})$
- C.  $\frac{1}{33}(6 + \sqrt{3})$
- D.  $\frac{1}{33}(6 - \sqrt{3})$

2.

For what range of values of  $x$  is  $x^2 - 2x - 3 \leq 0$

- A.  $\{x: -1 \leq x \leq 3\}$
- B.  $\{x: -3 \leq x \leq 1\}$
- C.  $\{x: -3 \leq x \leq -1\}$
- D.  $\{x: 1 \leq x \leq 3\}$

3.

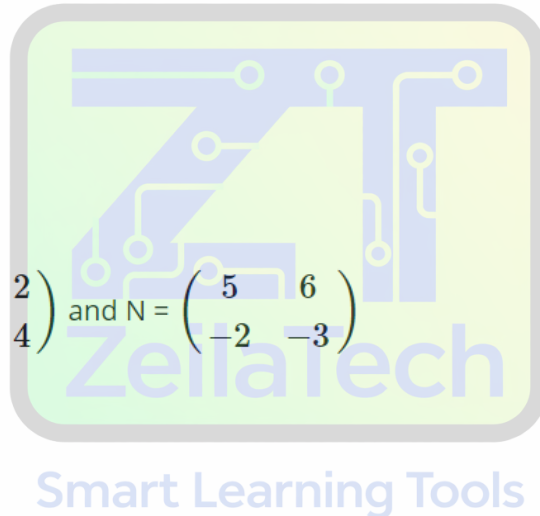
Given that  $M = \begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}$  and  $N = \begin{pmatrix} 5 & 6 \\ -2 & -3 \end{pmatrix}$   
calculate  $(3M - 2N)$

- A.  $\begin{pmatrix} 1 & 6 \\ 1 & 18 \end{pmatrix}$
- B.  $\begin{pmatrix} -1 & -6 \\ 1 & 18 \end{pmatrix}$
- C.  $\begin{pmatrix} 1 & 6 \\ -1 & -18 \end{pmatrix}$
- D.  $\begin{pmatrix} -1 & -6 \\ -1 & -18 \end{pmatrix}$

4.

Simplify  $\frac{1}{3} \log 8 + \frac{1}{3} \log 64 - 2 \log 6$

- A.  $\log \frac{2}{7}$
- B.  $\log 2$
- C.  $\log \frac{2}{9}$
- D.  $\log 9$



5.

$$\text{Solve } \left(\frac{1}{9}\right)^{x+2} = 243^{x-2}$$

- A.  $\frac{7}{5}$
- B.  $\frac{6}{7}$
- C.  $\frac{-7}{6}$
- D.  $\frac{-6}{7}$

6.

$$g(x) = 2x + 3 \text{ and } f(x) = 3x^2 - 2x + 4$$

- A. 37
- B. 1
- C. -3
- D. -179

7.

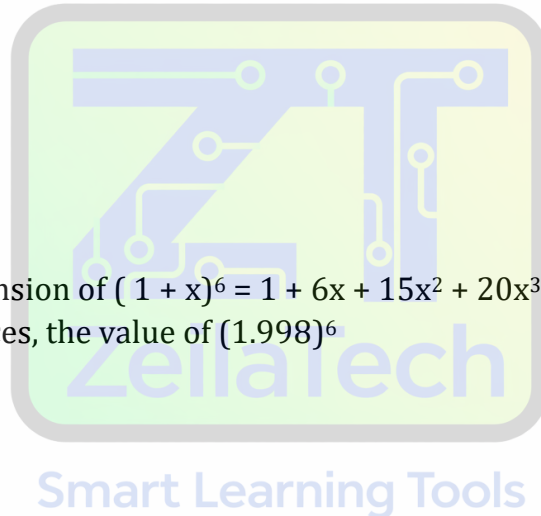
Using binomial expansion of  $(1 + x)^6 = 1 + 6x + 15x^2 + 20x^3 + 6x^4 + x^6$ , find, correct to three decimal places, the value of  $(1.998)^6$

- A. 63.616
- B. 63.167
- C. 62.628
- D. 62.629

8.

In how many ways can 8 persons be seated on a bench if only three seats are available?

- A. 100
- B. 125
- C. 336
- D. 427



9.

If  $\alpha$  and  $\beta$  are the roots of  $3x^2 - 7x + 6 = 0$ , find  $\frac{1}{\alpha} + \frac{1}{\beta}$

- A.  $\frac{7}{6}$
- B.  $\frac{7}{3}$
- C.  $\frac{14}{5}$
- D.  $\frac{14}{3}$

10.

If  $f(x) = 4x^3 + px^2 + 7x - 23$  is divided by  $(2x - 5)$ , the remainder is 7. find the value of  $p$

- A. -7.0
- B. -8.0
- C. -9.6
- D. 9

11.

For what value of  $k$  is  $4x^2 - 12x + k$ , a perfect square?

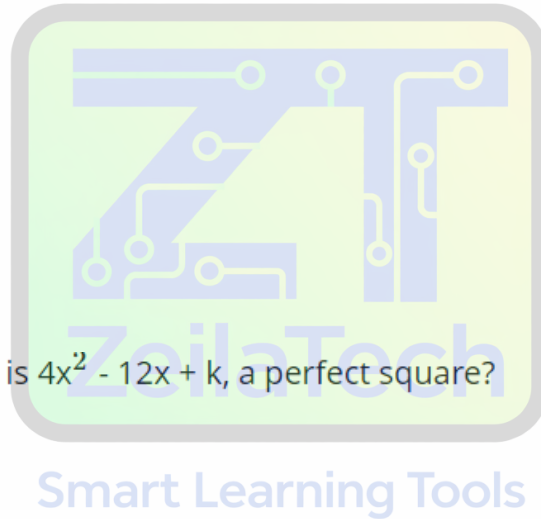
- A. -9
- B.  $-\frac{9}{4}$
- C.  $\frac{9}{4}$
- D. 9

12.

A binary operation  $*$  is defined on the set of real numbers,  $R$ , by

$$P * Q = \frac{q^2 - p^2}{2pq}. \text{ Find } 3 * 2$$

- A.  $\frac{13}{12}$
- B.  $\frac{5}{12}$
- C.  $-\frac{5}{12}$
- D.  $-\frac{1}{2}$



13.

Find the inverse of  $\begin{pmatrix} 4 & 2 \\ -3 & -2 \end{pmatrix}$

A.  $\begin{pmatrix} 1 & 1 \\ -1.5 & -2 \end{pmatrix}$

B.  $\begin{pmatrix} 1 & -1 \\ 1.5 & -2 \end{pmatrix}$

C.  $\begin{pmatrix} -2 & 1 \\ 1.5 & 1 \end{pmatrix}$

D.  $\begin{pmatrix} -2 & -1 \\ 1.5 & 1 \end{pmatrix}$

14.

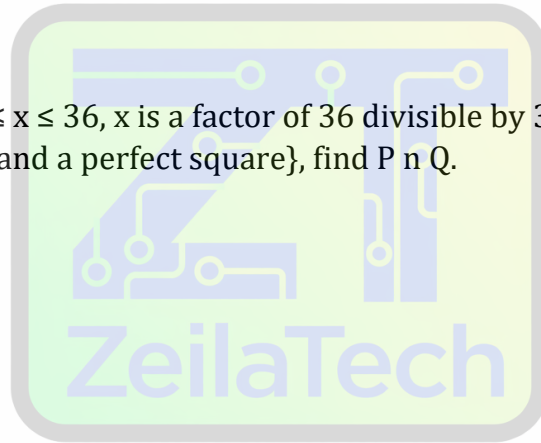
Given that  $P = \{x: 0 \leq x \leq 36, x \text{ is a factor of } 36 \text{ divisible by } 3\}$  and  $Q = \{x: 0 \leq x \leq 36, x \text{ is an even number and a perfect square}\}$ , find  $P \cap Q$ .

A.  $\{1,4,9,36\}$

B.  $\{3,9,36\}$

C.  $\{9,36\}$

D.  $\{36\}$



Smart Learning Tools

15.

A body of mass 15kg is placed on a smooth plane which is inclined at  $60^\circ$  to the horizontal. If the box is at rest,

calculate the normal reaction to the plane. [ Take  $g = 10\text{m/s}^2$  ]

A. 129.9N

B. 75N

C. 60.0N

D. 7.5N

16.

A fair die is tossed 60 times and the results are recorded in the table

Number of die	1	2	3	4	5	6
Frequency	15	10	14	2	8	11

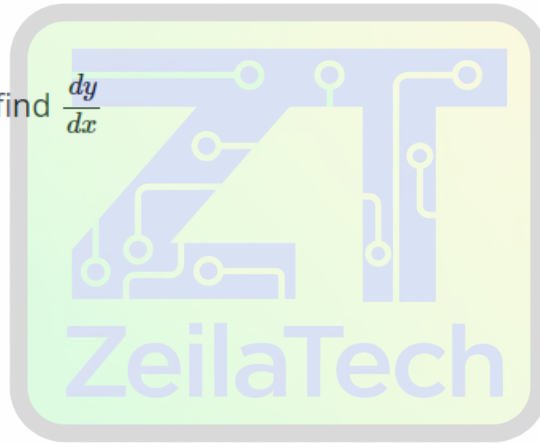
Find the probability of obtaining a prime number.

- A.  $\frac{7}{30}$
- B.  $\frac{1}{6}$
- C.  $\frac{7}{15}$
- D.  $\frac{8}{15}$

17.

If  $2y^2 + 7 = 3y - xy$ , find  $\frac{dy}{dx}$

- A.  $\frac{-y}{4x+y-3}$
- B.  $\frac{y}{4x+y-3}$
- C.  $\frac{-y}{4x+x-3}$
- D.  $\frac{y}{4x+x-3}$



18.

Three forces,  $F_1$  (8N,  $030^\circ$ ),  $F_2$  (10N,  $150^\circ$ ) and  $F_3$  (KN,  $240^\circ$ ) are in equilibrium. Find the value of N

- A.  $5\sqrt{3}$
- B.  $6\sqrt{2}$
- C.  $6\sqrt{3}$
- D.  $9\sqrt{3}$

19.

In  $\triangle PQR$ ,  $\overline{PQ} = 5i - 2j$  and  $\overline{QR} = 4i + 3j$ . Find  $\overline{RP}$ .

- A.  $-i - 5j$
- B.  $-9 - j$
- C.  $i + 5j$
- D.  $-9i + j$

20.

A stone is thrown vertically upward and distance,  $S$  metres after  $t$  seconds is given by  $S = 12t + \frac{5}{2t^2} - t^3$ .

Calculate the maximum height reached.

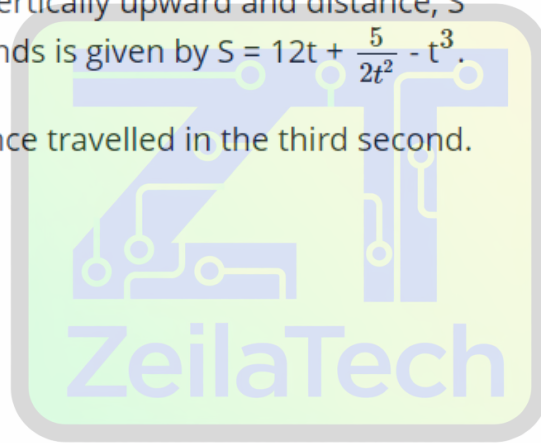
- A. 418.5m
- B. 56.0m
- C. 31.5m
- D. 30.0m

21.

A stone is thrown vertically upward and distance,  $S$  metres after  $t$  seconds is given by  $S = 12t + \frac{5}{2t^2} - t^3$ .

Calculate the distance travelled in the third second.

- A. 5.5m
- B. 14.5m
- C. 26.0m
- D. 30.0m



Smart Learning Tools

22.

Given that  $F^1(x) = x^3 \sqrt{x}$ , find  $f(x)$

- A.  $\frac{2x^{9/2}}{9} + c$
- B.  $\frac{13}{15}$
- C.  $\frac{-33}{65}$
- D.  $\frac{-48}{65}$

23.

If  $(1 - 2x)^4 = 1 + px + qx^2 - 32x^3 + 164$ , find the value of  $(q - p)$

- A. -32
- B. -16
- C. 16
- D. 32

24.

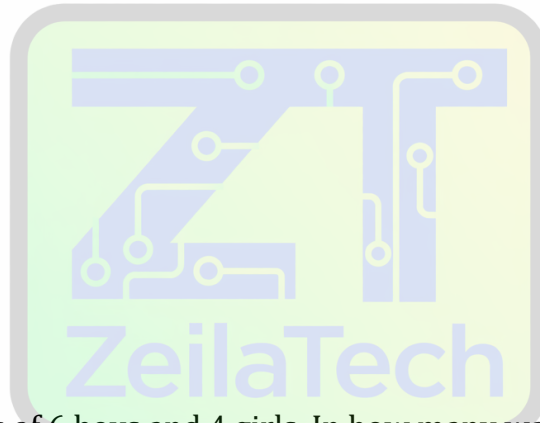
If  $\sin x = \frac{12}{13}$  and  $\sin y = \frac{4}{5}$ , where  $x$  and  $y$  are acute angles, find  $\cos(x + y)$

- A.  $\frac{48}{65}$
- B.  $\frac{13}{15}$
- C.  $\frac{-33}{65}$
- D.  $\frac{-48}{65}$

25.

The first term of an AP is 4 and the sum of the first three terms is 18. Find the product of the first three terms

- A. 292
- B. 272
- C. 192
- D. 172



26.

A committee consists of 6 boys and 4 girls. In how many ways can a sub-committee consisting of 3 boys and 2 girls be formed if one particular boy and one particular girl must be on the sub-committee?

- A. 120
- B. 80
- C. 56
- D. 30

27.

If  $\sqrt{5} \cos x + \sqrt{15} \sin x = 0$ , for  $0^\circ < x < 360^\circ$ , find the values of  $x$ .

- A.  $30^\circ$  and  $150^\circ$
- B.  $150^\circ$  and  $210^\circ$
- C.  $150^\circ$  and  $330^\circ$
- D.  $210^\circ$  and  $330^\circ$

28.

If  $2i + pj$  and  $4i - 2j$  are perpendicular, find the value of  $p$ .

A. 2

B. 3

C. 4

D. 5

29.

Consider the following statements:

X: Benita is polite

y: Benita is neat

z: Benita is intelligent

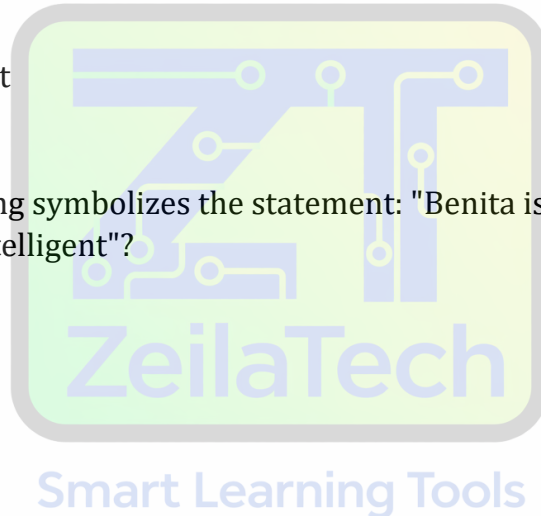
Which of the following symbolizes the statement: "Benita is neat if and only if she is neither polite nor intelligent"?

A.  $y \Leftrightarrow \sim x \vee z$

B.  $y \Leftrightarrow \sim x \vee \sim z$

C.  $y \Leftrightarrow \sim x \wedge \sim z$

D.  $y \Leftrightarrow \sim x \wedge z$



30.

A bag contains 8 red, 4 blue and 2 green identical balls. Two balls are drawn randomly from the bag without replacement. Find the probability that the balls drawn are red and blue.

A.  $12/91$

B.  $16/91$

C.  $30/91$

D.  $32/91$

31.

The gradient of  $y = 3x^2 + 11x + 7$  at  $P(x, y)$  is  $-1$ . Find the coordinates of  $P$ .

A.  $(-3, -2)$

- B. (-2,-3)
- C. (-2,3)
- D. (2,-3)

32.

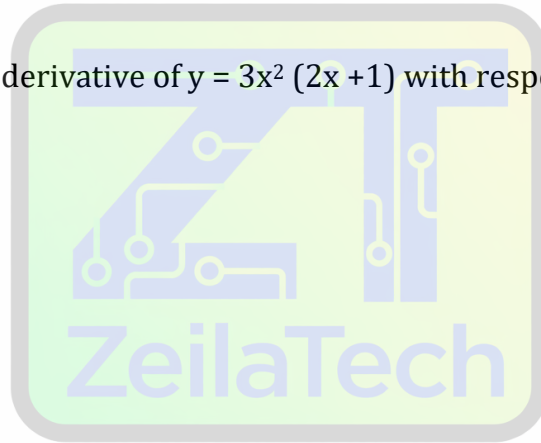
Find the equation of the normal to the curve  $y = 2x^2 - 5x + 10$  at  $P(1, 7)$ .

- A.  $y+x-3 = 0$
- B.  $y-x+6=0$
- C.  $y - x - 6=0$
- D.  $y -x+ 3 = 0$

33.

Find the value of the derivative of  $y = 3x^2 (2x + 1)$  with respect to  $x$  at the point  $x = 2$ .

- A. 72
- B. 84
- C. 96
- D. 120



34.

Find the radius of the circle  $2x^2 - 4x + 2y^2 - 6y - 2 = 0$ .

- A.  $17/4$
- B.  $17/2$
- C.  $17/\sqrt{2}$
- D.  $\sqrt{17}/2$

35.

Given that  $f: x \rightarrow x^2 - x + 1$  is defined on the Set  $Q = \{ x : 0 \leq x < 20, x \text{ is a multiple of } 5\}$ . find the set of range of  $F$ .

- A.  $\{21, 91, 221\}$
- B.  $\{21, 91, 221, 381\}$
- C.  $\{1, 21, 91, 221\}$
- D.  $\{1, 21, 91, 221, 381\}$

36.

If  $\frac{15-2x}{(x+4)(x-3)} = \frac{R}{(x+4)} + \frac{9}{7(x-3)}$ , find the value of R

- A.  $\frac{-32}{7}$
- B.  $\frac{-23}{7}$
- C.  $\frac{23}{7}$
- D.  $\frac{32}{7}$

The table shows the distribution of marks obtained by some students in a test

Marks	0-9	10-19	20-29	30-39	40-49
Frequency	4	12	16	6	2

37.

What is the upper class boundary of the upper quartile class?

- A. 49.5
- B. 39.5
- C. 29.5
- D. 19.5

38.

Find the modal class mark.

- A. 4.5
- B. 14.5
- C. 24.5
- D. 34.5