

مراجعة ليلة الامتحان.. وبنك لأهم المسائل المتوقعة
روشة تفوق.. أعتها متخصصون فى وضع الامتحانات



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[1] Choose the correct answer:

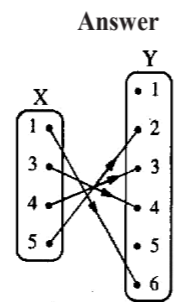
- The fourth proportional to the quantities 6, 21, and 10 is
(25, 35, 15 or 45)
- If b is a middle proportional between a and c, then
($a^2 = b \times c$, $b^2 = a \times c$, $c^2 = a \times b$ or $b = a \times c$)
- If the point (x, y) lies in the second quadrant, then xy zero.
(=, >, < or \geq)
- The arithmetic mean of values 7, 9, 3, 6 and 5 equals
(3, 4, 6 or 7)
- If $f(x) = 3$, then $f(-5) - f(5) = \dots$
(-1, 0, 1 or 6)
- If $y \propto \frac{1}{x}$, then $\frac{y_1}{y_2} = \dots$
($\frac{m x_1}{x_2}$, $\frac{x_1}{x_2}$, $\frac{x_2}{x_1}$ or $\frac{1}{x_1 x_2}$)
- If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = m$ (where $m \in \mathbb{R}^+$), then $\frac{ace}{bdf} = \dots$
(m, 3m, m^3 or $3m^3$)
- If $y \propto x$ and $y = 5$ when $x = 15$, then $y = \dots$ when $x = 9$
($\frac{1}{6}$, $\frac{1}{3}$, 3 or 6)
- The range of the values 7, 3, 6, 9 and 5 is
(3, 4, 6 or 12)
- If $X = \{5, 6, 7\}$, then $n(X^2) = \dots$
(3, 6, 9 or 12)
- The simplest and easiest dispersion measure is the
(median, range, mode or arithmetic mean)
- The positive square root to the average of squares deviations of values from the mean is the
(range, arithmetic mean, standard deviation or median)
- If $n(X) = 2$ and $n(Y \times X) = 6$, then $n(Y^2) = \dots$
(4, 9, 12 or 16)
- The third proportional of the two numbers 5 and 10 is
($\frac{1}{5}$, 15, 20 or 25)
- The middle proportional between $3x^3$ and $27x$ equal
($9x^2$, $\pm 9x^4$, $\pm 9x^2$ or $9x^4$)

- If $2^x = 3$, then $8^x = \dots$
(1, 3, 9 or 27)
- If $(x-1, 11) = (8, y+3)$, then $\sqrt{x+2y} = \dots$
(5, ± 5 , 7 or ± 7)
- If $n(X) = 3$ and $n(X \times Y) = 12$, then $n(Y) = \dots$
(4, 9, 15 or 36)
- If $3a = 4b$, then $a : b = \dots$
(3 : 4, 4 : 3, 3 : 7 or 4 : 7)
- The graphical form which represents the direct variation between x and y is
- If $3a = \frac{5}{6}b$, then $\frac{a}{b} = \dots$

- If $(3, 5) \in \{3, 6\} \times \{x, 8\}$, then $x = \dots$
(8, 6, 3 or 5)
- If $\frac{x}{2} = \frac{y}{7} = \frac{2x+y}{a}$, then $a = \dots$
(5, 9, 11 or 16)
- If $\sum (x - \bar{x})^2 = 36$ for a set of values whose number is 9, then $\sigma = \dots$
(2, 4, 18 or 27)
- If $y^2 - 4xy + 4x^2 = 0$, then ...
($Y \propto x$, $Y \propto x^2$, $Y \propto \frac{1}{x}$ or $Y \propto \frac{1}{x^2}$)
- If a, x, b and 2x are proportional, then $\frac{a}{b} = \dots$
(2 : 1, 1 : 2, 1 : 3 or 1 : 4)

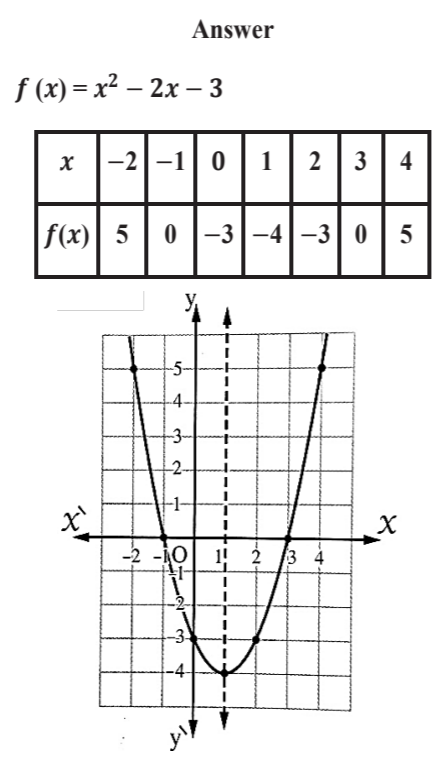
- Answers
- 35
 - $b^2 = a \times c$
 - <
 - 6
 - 0
 - $\frac{x_2}{x_1}$
 - m^3
 - 3
 - 6
 - 9
 - range.
 - standard deviation.
 - 9
 - 20
 - $9x^2$
 - 27
 - 17
 - 5
 - 18
 - 4 : 3
 - 20
 - 21
 - $\frac{5}{18}$
 - 5
 - 23
 - 11
 - 2
 - 25
 - $y \propto x$
 - 1 : 2

[2] If $X = \{1, 3, 4, 5\}$, $Y = \{1, 2, 3, 4, 5, 6\}$ and R is a relation from X to Y where "a R b" means "a + b = 7" for all $a \in X$ and $b \in Y$, write R and represent it by an arrow diagram, show that R is a function? Write its range.



$R = \{(1, 6), (3, 4), (4, 3), (5, 2)\}$
R is a function because every element of X has only one image in Y
The range = $\{6, 4, 3, 2\}$

- [3] Represent graphically the function $f: f(x) = x^2 - 2x - 3$ where $x \in [-2, 4]$.
Form the graph, find:
- the maximum or (minimum) value of the function.
 - the equation of the symmetry axis.
 - The coordinate of the vertex of the curve.



- = -4
- The equation of the axis of symmetry is $x = 1$.
 - The coordinate of the vertex of the curve is (1, -4).

[4] If a, b, c and d are in continued proportion, prove that: $\frac{ab-cd}{b^2-c^2} = \frac{a+b}{b}$

Answer

$\therefore \frac{a}{b} = \frac{b}{c} = \frac{c}{d} = m$
 $\therefore c = dm, b = dm^2, a = dm^3$
 $\therefore \frac{ab-cd}{b^2-c^2} = \frac{dm^3 \times dm^2 - dm \times d}{d^2 m^4 - d^2 m^2}$
 $= \frac{d^2 m^5 - d^2 m}{d^2 m^4 - d^2 m^2}$
 $= \frac{d^2 m(m^4 - 1)}{d^2 m^2(m^2 - 1)} = \frac{(m^2 - 1)(m^2 + 1)}{m(m^2 - 1)}$
 $= \frac{m^2 + 1}{m}$ (1)
 $\therefore \frac{a+c}{b} = \frac{dm^3 + dm}{dm^2} = \frac{dm(m^2 + 1)}{dm^2}$
 $= \frac{m^2 + 1}{m}$ (2)
From (1) and (2): $\therefore \frac{ab-cd}{b^2-c^2} = \frac{a+b}{b}$

[5] A car moves with a uniform velocity where the covered distance varies directly with the time. If the car covered 150 km in 6 hours, find the distance covered by that car in 10 hours.

Answer

\therefore The distance (d) \propto the time (t).
 $\therefore \frac{d_1}{d_2} = \frac{t_1}{t_2} \quad \therefore \frac{150}{d_2} = \frac{6}{10}$
 $\therefore d_2 = \frac{10 \times 150}{6} = 250$ km.

[6] If $\frac{21x+a}{7x+b} = \frac{a}{b}$ and $x \neq 0$, then find the value of $\frac{a+2b}{2a}$.

Answer

$\therefore \frac{21x+a}{7x+b} = \frac{a}{b}$
 $\therefore 21xb + a + b = 7xa + b + a$
 $\therefore 21xb + a + b = 7xa + b + a$
 $\therefore \frac{a}{b} = \frac{21x}{7x} = 3$
 $\therefore a = 3m, b = m$
 $\therefore \frac{a+2b}{2a} = \frac{3m+2m}{6m} = \frac{5m}{6m} = \frac{5}{6}$

[7] The following table shows the frequency distribution of a number of students who won in an art competition from a school having 20 classes:

Number of students	0	1	2	3	4	5	Total
Number of classes	1	3	5	6	3	2	20

Find the mean and the standard deviation of the number of students.

Answer

Number of students (x)	Number of classes (k)	$x \times k$
0	1	0
1	3	3
2	5	10
3	6	18
4	3	12

5	2	10
Total	20	53

The mean of $(\bar{x}) = \frac{53}{20} = 2.65$ students.

x	k	$x - \bar{x}$	$(x - \bar{x})^2$	$\frac{(x - \bar{x})^2}{x \times k}$
0	1	-2.65	7.0225	7.0225
1	3	-1.65	2.7225	8.1675
2	5	-0.65	0.4225	2.1125
3	6	0.35	0.1225	0.735
4	3	1.35	1.8225	5.4675
5	2	2.35	5.5225	11.045
Total	20			34.55

The standard deviation $(\sigma) = \sqrt{\frac{34.55}{20}} = 1.3$ student.

[8] If $X = \{1, 2\}$ and $Y = \{2, 3\}$, prove that:

$X \times (X \cap Y) = (X \times X) \cap (X \times Y)$

Answer

$\therefore X \times (X \cap Y) = \{1, 2\} \times \{2\} = \{(1, 2), (2, 2)\} \rightarrow (1)$

$X \times X = \{1, 2\} \times \{1, 2\} = \{(1, 1), (1, 2), (2, 1), (2, 2)\}$

$X \times Y = \{1, 2\} \times \{2, 3\} = \{(1, 2), (1, 3), (2, 2), (2, 3)\}$

$\therefore (X \times X) \cap (X \times Y) = \{(1, 2), (2, 2)\} \rightarrow (2)$

From (1) and (2):

$\therefore X \times (X \cap Y) = (X \times X) \cap (X \times Y)$

$\{(1, 2), (2, 2)\} \rightarrow (2)$

From (1) and (2):

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$\therefore 14 = 42m \quad \therefore m = \frac{1}{3}$

$\therefore y = \frac{1}{3}x$ (The relation between x and y)

[b] $\therefore x = 90$

$\therefore y = \frac{1}{3} \times 90 = 30$

[11] If b is a middle proportional between a and c, then prove that:

$\frac{b}{b+c} = \frac{a-b}{a-c}$

Answer

$\therefore \frac{a}{b} = \frac{b}{c} = m$

$\therefore b = cm, a = cm^2$

$\therefore \frac{b}{b+c} = \frac{cm}{cm+c} = \frac{cm}{c(m+1)}$

$= \frac{m}{m+1}$ (1)

$\frac{a-b}{a-c} = \frac{cm^2 - cm}{cm^2 - c} = \frac{cm(m-1)}{c(m^2-1)}$

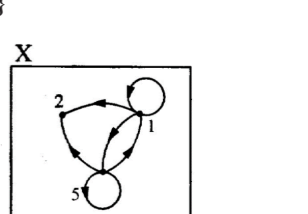
$= \frac{m(m-1)}{(m+1)(m-1)} = \frac{m}{m+1}$ (2)

From (1) and (2): $\therefore \frac{b}{b+c} = \frac{a-b}{a-c}$

[12] If $X = \{1, 2, 5\}$ and R is a relation on X where "a R b" means "a + 2b = an odd number" for all $a \in X$ and $b \in Y$, write R and represent it by an arrow diagram, show that R is a function?

Answer

$R = \{(1, 1), (1, 2), (1, 5), (5, 1), (5, 2), (5, 5)\}$



R is not a function.

[13] If $\frac{21x-y}{7x-z} = \frac{y}{z}$, prove that $y \propto z$.

Answer

$\therefore \frac{21x-y}{7x-z} = \frac{y}{z}$

$\therefore 21xz - zy = 7xy - zy$

$\therefore 21xz = 7xy \quad \therefore 3z = y$

$\therefore y \propto z$

[14] If $4x - 3y : 2x + y = \frac{4}{7}$, find in the simplest form the ratio $x : y$.

Answer

$\therefore \frac{4x-3y}{2x+y} = \frac{4}{7} \quad \therefore 7(4x-3y) = 4(2x+y)$

$\therefore 28x - 21y = 8x + 4y$

$\therefore 28x - 8x = 21y + 4y$

$\therefore 20x = 25y \quad \therefore \frac{x}{y} = \frac{25}{20} \quad \therefore \frac{x}{y} = \frac{5}{4}$

[15] If $y = 1 + b$ where b varies inversely as x^2 and $y = 17$ as $x = \frac{1}{2}$.

Find the relation between x and y, then find the value of y when $x = 2$.

Answer

$\therefore b \propto \frac{1}{x^2}$

$\therefore b = \frac{m}{x^2}$, where m is a constant $\neq 0$

$\therefore y = 1 + \frac{m}{x^2} \quad \therefore y = 17$ as $x = \frac{1}{2}$

$\therefore 17 = 1 + \frac{m}{(\frac{1}{2})^2} \quad \therefore 17 = 1 + \frac{m}{\frac{1}{4}}$

By subtracting 1 from both sides:

$\therefore 16 = \frac{m}{\frac{1}{4}} \quad \therefore m = 16 \times \frac{1}{4} = 4$

$\therefore y = 1 + \frac{4}{x^2}$

At $x = 2$: $\therefore y = 1 + \frac{4}{2^2} = 1 + \frac{4}{4} = 2$

[a] $\therefore y \propto x \quad \therefore y = mx$