

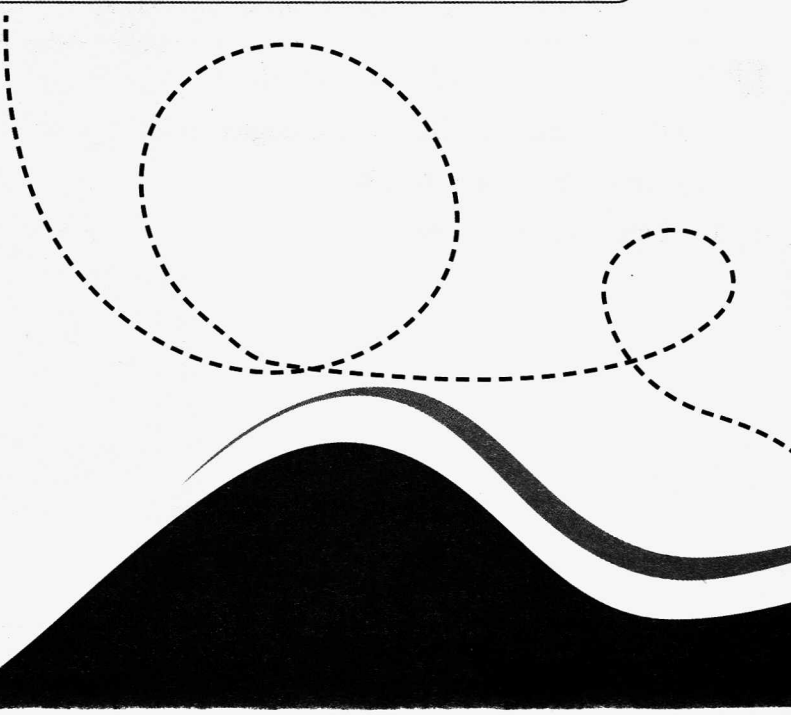


2012 - 2013

Final examinations in algebra and statistics

Hint :

Questions referred to by using the mark (*) have been replaced in the governorates' examinations to suit the modifications of the syllabus for this year.





Models of tests from the school book



Model 1

Answer the following questions :

1 Complete each of the following :

- (1) From the methods of collecting data are,
- (2) If $(X + 5, 8) = (1, 6y + X)$, then $y = \dots\dots\dots$
- (3) If: $\frac{a}{b} = \frac{c}{d}$, then $\frac{\dots\dots + 3c}{5b + \dots\dots} = \frac{a}{b}$
- (4) If: $y \propto X$ and $y = 6$ when $X = 4$, then $\frac{y}{X} = \dots\dots\dots$
- (5) If: $n(X) = 5$, $n(X \times Y) = 15$, then $n(Y) = \dots\dots\dots$
- (6) If Ahmed answered 60% of the questions of a test with true answers and the number of questions which were answered incorrectly are 10 questions, then the number of all questions of the test is

2 Choose the correct answer from those given :

- (1) The fourth proportional of the quantities 3, 6, 6 is
 (a) 3 (b) 6 (c) 9 (d) 12
- (2) The ratio between the area of a square shaped region of side length l to the area of another square shaped region of side length $2l$ is
 (a) 1 : 2 (b) $l : 4$ (c) 1 : 4 (d) 4 : 1
- (3) If: $3Xy = 8$, then
 (a) $X \propto y$ (b) $y \propto X$ (c) $3X \propto 8y$ (d) $X \propto \frac{1}{y}$
- (4) The point $(-3, 4)$ lies in the quadrant.
 (a) first (b) second (c) third (d) fourth
- (5) If the function f from the set X to the set Y , then the range of $f \subset \dots\dots\dots$
 (a) X (b) Y (c) $X \times Y$ (d) \mathbb{R}

3 [a] If: $X = z + 8$, z varies inversely as y and $z = 2$, when $y = 3$

Find : y when $X = 3$

[b] Find the number that if we add it to each of the numbers 1, 7, 25, then they become in continued proportion.

4 [a] If : $\frac{a}{4} = \frac{b}{5} = \frac{c}{3}$, then prove that : $\frac{a-b+c}{a+b-c} = \frac{1}{3}$

[b] If : $X = \{2, 3, 4, 7\}$, $Y = \{1, 2, 3, 4, 7, 8\}$, R is a relation from the set X to the set Y such that "aRb" means "a + b is not a prime number" for all $a \in X$, $b \in Y$
Write R and represent it by an arrow diagram.

5 [a] If : $X = \{2, 3, 4\}$, $Y = \{3, 4, 5, 6, 7, 8\}$ and $f : X \longrightarrow Y$ where $f(x) = 9 - x$
Find the images of the elements of X by the function f

[b] The following table represents the number of children of 100 families in a city :

| Number of children | 0 | 1 | 2 | 3 | 4 | Total |
|--------------------|---|----|----|----|----|-------|
| Number of families | 6 | 15 | 40 | 25 | 14 | 100 |

Calculate each of the arithmetic mean and the standard deviation.



Answer the following questions :

1 Complete each of the following :

- (1) The range of the set of values 8 , 5 , 10 , 6 , 14 is
- (2) If the number 6 is the positive mean proportion of the two numbers 2 and a , then a =
- (3) The point (5 , - 3) lies in the quadrant.
- (4) If : $X = \{2, 3\}$, then $X^2 = \dots\dots\dots$
- (5) If : $\frac{x}{5} = \frac{y}{4} = \frac{x+y}{k}$, then k =
- (6) The teacher corrected the exam papers of one of his classes in half an hour. If the teacher took one and half an hour for correcting 120 exam papers , then the number of students in this class is

2 Choose the correct answer from those given :

- (1) The simplest and easiest dispersion measure is
 - (a) the range.
 - (b) the arithmetic mean.
 - (c) the median.
 - (d) the mode.
- (2) If : $3a = \frac{5}{6}b$, then $\frac{a}{b} = \dots\dots\dots$
 - (a) $\frac{18}{5}$
 - (b) $\frac{15}{6}$
 - (c) $\frac{6}{15}$
 - (d) $\frac{5}{18}$
- (3) If $(3, 5) \in \{3, 6\} \times \{x, 8\}$, then $x = \dots\dots\dots$
 - (a) 8
 - (b) 6
 - (c) 3
 - (d) 5

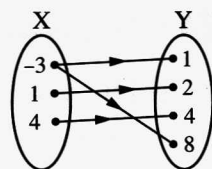


- (4) If : $X = \{5, 6, 7\}$, then $n(X^2) = \dots\dots\dots$
 (a) 3 (b) 6 (c) 9 (d) 12
- (5) If the point $(X, 7)$ lies on the y-axis , then $5X + 1 = \dots\dots\dots$
 (a) 0 (b) 1 (c) 5 (d) 6
- (6) The set of images of the elements of the domain of the function is called $\dots\dots\dots$
 (a) the rule. (b) the domain. (c) the range. (d) the codomain.

- 3 [a] If y varies as X and $y = \frac{5}{3}$, when $X = \frac{1}{6}$ Find the value of X when $y = \frac{3}{4}$
 [b] Find the number which should be subtracted from each of the numbers 3 , 7 , 19 to be in continued proportion.

- 4 [a] If : $\frac{X+y}{5} = \frac{y+z}{3} = \frac{z+X}{6}$ Prove that : $\frac{X-z}{2} = \frac{X+y+z}{7}$
 [b] If : $X = \{1, 2\}$, $Y = \{2, 3, 4\}$, then find : $X \times Y$

- 5 The opposite arrow diagram represents the relation R from the set X to the set Y , where :
 $X = \{-3, 1, 4\}$, $Y = \{1, 2, 4, 8\}$,
 Write R . Is R a function ? why ?



Answer the following questions :

- 1 Complete each of the following :
- (1) The ordered pair (X^2, y^2) where $X \neq 0$, $y \neq 0$ lies in $\dots\dots\dots$ quadrant.
 (2) The positive square root of the average of the squares of deviations of values from their mean is called $\dots\dots\dots$
 (3) If : $\frac{a}{b} = \frac{7}{4}$, then $\frac{4a}{b} = \dots\dots\dots$
 (4) If : $y^2 - 4Xy + 4X^2 = 0$, then $y \propto \dots\dots\dots$
 (5) If : $X, X + 41$ are two prime numbers , then $X = \dots\dots\dots$
 (6) If : $X = \{2\}$, then $X^2 = \dots\dots\dots$

- 2 Choose the correct answer from those given :
- (1) The first proportion of the quantities $\dots\dots\dots$, 21 , 15 , 35
 (a) $\frac{3}{7}$ (b) 3 (c) 7 (d) 9
 (2) If : $4X^2 = 9y^2$, then $\frac{X}{y} = \dots\dots\dots$
 (a) $\frac{9}{4}$ (b) $\frac{3}{2}$ (c) $\pm \frac{2}{3}$ (d) $\pm \frac{3}{2}$

- (3) If: $\sqrt{2} \sqrt{3} \sqrt{5} \sqrt{6} \sqrt{7} \sqrt{8} = 12\sqrt{70}$, then $\sqrt{3} \sqrt{5} \sqrt{6} \sqrt{7} \sqrt{8} \sqrt{10} = \dots\dots\dots$
 (a) $60\sqrt{14}$ (b) $120\sqrt{7}$ (c) $12\sqrt{70}$ (d) $60\sqrt{7}$
- (4) If: $X = \{1, 2\}$, $Y = \{0\}$, then $n(X \times Y) = \dots\dots\dots$
 (a) 0 (b) 1 (c) 2 (d) 3
- (5) If the point $(a, 3)$ lies on the straight line which represents the function $f: \mathbb{R} \rightarrow \mathbb{R}$, where $f(x) = 4x - 5$, then $a = \dots\dots\dots$
 (a) 1 (b) 2 (c) 3 (d) 4
- (6) The set which has the greatest dispersion in the following sets is $\dots\dots\dots$
 (a) 28, 17, 30, 36, 20 (b) 31, 35, 26, 37, 41
 (c) 25, 39, 19, 5, 27 (d) 20, 19, 29, 37, 43

3 [a] If: $3a = 2b$, then find the value of: $\frac{3a-b}{2a-b}$

[b] If: $f(x) = x^2 - x + 3$, then find: $f(-2)$, $f(1)$, $f(0)$

4 [a] If y is the middle proportional between x and z , prove that: $\frac{xz}{y(y+z)} = \frac{x}{x+y}$

[b] If: $y = 1 + b$ where b varies inversely as the square of x , and $y = 17$ when $x = \frac{1}{2}$
 Find the relation between y and x then find the value of y when $x = 2$

5 [a] If R is a relation on \mathbb{N} (set of natural numbers), where " aRb " means " $a \times b = 18$ " for all $a \in \mathbb{N}$, $b \in \mathbb{N}$. Write R and represent it by an arrow diagram.

[b] Calculate the arithmetic mean and the standard deviation of the set of values 73, 54, 62, 71, 60

[c] The ratio between two positive integers is 3 : 7. If the number 5 is subtracted from each of them, then the ratio becomes 1 : 3 find the two numbers.



Answer the following questions :

1 Complete each of the following :

(1) The arithmetic mean of the set of values 4, 13, 18, 25 and 30 equals $\dots\dots\dots$

(2) If: $\frac{3a-2b}{7a+4b} = \text{zero}$, then $\frac{b}{a} = \dots\dots\dots$

(3) If there are 200 calory in 50 grams of one kind of food, then the number of calories in 30 grams of this food equals $\dots\dots\dots$

(4) If: 1, x , 9, y are in continued proportion, then $x = \dots\dots\dots$ and $y = \dots\dots\dots$

(5) The function f , where $f(x) = x^4 - 2x^3 + 7$ is a polynomial of $\dots\dots\dots$ degree.

(6) If x and y are two variables and if $\frac{x_1 y_1}{x_2 y_2} = 1$, then $y \propto \dots\dots\dots$



2 Choose the correct answer from those given :

- (1) If : $\frac{a}{b} = \frac{5}{3}$, then $\frac{3a}{5b}$ equals
- (a) 1 (b) $\frac{5}{3}$ (c) 3 (d) 15
- (2) If : $X = \{5, 6, 7\}$, then $n(X^2) = \dots\dots\dots$
- (a) 3 (b) 6 (c) 9 (d) 12
- (3) If : $y^2 + 4X^2 = 4Xy$, then
- (a) $y \propto X$ (b) $y \propto X^2$ (c) $y \propto \frac{1}{X}$ (d) $y \propto \frac{1}{X^2}$
- (4) If : f is an odd number , then the next odd number directly is
- (a) f^2 (b) $f^2 + f$ (c) $f + 6$ (d) $f + 2$
- (5) If all the individuals are equal in values , then
- (a) $\bar{X} = 0$ (b) $\sigma = 0$ (c) $X - \bar{X} > 0$ (d) $X - \bar{X} < 0$
- (6) If $(4, 4) \in \{2, X\} \times \{1, 4\}$, then $X = \dots\dots\dots$
- (a) 2 (b) 3 (c) 4 (d) 8

3 [a] If : $a^2 b^2 + \frac{1}{4} = ab$, then prove that : a varies inversely as b

[b] If : $\frac{a^2 + b^2}{b^2} = \frac{b^2 + c^2}{c^2}$, then prove that : b is the middle proportional between a and c

4 [a] Find the arithmetic mean and the standard deviation of the following data :

| | | | | | |
|---------------|-----|-----|-----|-----|-----|
| The set | 0 - | 2 - | 4 - | 6 - | 8 - |
| The frequency | 5 | 9 | 15 | 15 | 6 |

[b] If : $y \propto X$ and $y = 20$ when $X = 7$, find y when $X = 14$

5 [a] If : $X = \{1, 2, 5, 7\}$, $Y = \{2, 3, 7, 8\}$ and R is a relation from X to Y where " aRb " means " $a + b$ is an odd number" for all $a \in X$, $b \in Y$. Write R and represent it by an arrow diagram. Is R a function ? why ?

[b] If the weight of a body on the earth (w) varies as its weight on the moon (r)
 If $w_1 = 182$ kg when $r_1 = 35$ kg , find r_2 when $w_2 = 312$ kg.



Model 5

Answer the following questions :

1 Complete each of the following :

- (1) If : 5 , y , 4 , 1 are proportional quantities , then $y = \dots\dots\dots$
- (2) If : $y \propto X$ and $y = 2$ when $X = 8$, then $y = \dots\dots\dots$ when $X = 12$

- (3) The function f , where $f(x) = 2x - 6$ is represented graphically by a straight line intersects the x -axis at the point
- (4) If the arithmetic mean of a set of the values $a, 5, 8, 7, 6$ equals 6 then $a =$
- (5) The positive middle proportional between $4a^2$ and $25b^4$ is
- (6) If $(2x, 4) = (8, y + 1)$, then $\sqrt{x^2 + y^2} =$

2 Choose the correct answer from those given :

- (1) If $a, x, b, 2x$ are proportional, then $\frac{a}{b} =$
- (a) 2 : 1 (b) 1 : 2 (c) 1 : 3 (d) 1 : 4
- (2) If the point $(x - 5, 7 - x)$ lies in the second quadrant, then $x =$
- (a) 5 (b) 3 (c) 7 (d) 9
- (3) If $X = \{2\}$, $Y = \{0, 4\}$, then $n(X \times Y) =$
- (a) 8 (b) 80 (c) 6 (d) 2
- (4) If the relation $R = \{(2, 3), (5, 1), (4, 6)\}$, then R represents a function whose range is
- (a) $\{2, 4, 5\}$ (b) $\{1, 3, 6\}$ (c) \mathbb{N} (d) \mathbb{Z}
- (5) If the dispersion of a set of values equals zero, then
- (a) The difference between the individuals is small.
 (b) The difference between the individuals is great.
 (c) All the values of the individuals are equal.
 (d) The arithmetic mean of these values is zero.
- (6) Notice the relation among the numbers in the pattern : $0.75, 1\frac{1}{4}, 1.75, x, 2\frac{3}{4}, \dots$, then the value of x is
- (a) 2.75 (b) 2.5 (c) 2.25 (d) 2

3 [a] If $\frac{x}{y} = \frac{2}{5}$, what is the value of the expression : $\frac{2x + y}{x + 4y}$?

[b] If $4x^2 + 9y^2 = 12xy$, then prove that : x varies as y

4 [a] Represent graphically the function $f : f(x) = (x - 3)^2, x \in [0, 6]$, from the graph deduce : the vertex of the curve and maximum or minimum value of the function.

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

5 [a] If $X = \{2, 3, 4, 7\}$, $Y = \{1, 2, 3, 4, 7, 8\}$ and R is a relation from X to Y , where " aRb " means " $a - b$ is an odd number" for all $a \in X, b \in Y$.

Write R and represent it by an arrow diagram

[b] If the velocity (v) of the water running through a pipe varies inversely as the square of the radius of the pipe (r) and $v = 5$ cm/sec. when $r = 3$ cm.

Find : v when $r = 15\frac{3}{4}$ cm.