

VARIATION

KCSE 1989 – 2012 Form 3 Mathematics

1.	1989 Q6 P2 The force attraction between two bodies varies inversely as the square of the distance between them. When the distance between them is 2metres, the force of attraction is 0.5 newtons. Find the force when the distance between them is 0.4metres (2marks)
2.	1990 Q2 P1 Two variables p and q are such that p is directly proportional to x and q is inversely proportional to x. When $x = 2$ their sum is 8 and when $x = 3$ their sum is 7. Find the constants of proportionality (4marks)
3.	1990 Q22 P2 Three quantities P, Q and R are such that P varies directly as the square of Q and inversely as the square root of R. Given that Q increases by 5% and R decreases by 36%, find the percentage change in P. (5marks) If $P = 6$, when $Q = 12$ and $R = 25$ find the value of P when $Q = 15$ and $R = 81$ (3marks)
4.	1991 Q2 P1 Given that x varies directly as the square of y and $x = 2$ when $y = 1$, find x when $y = 4$ (3marks)
5.	1993 Q5 P1 The mass of a certain metal rod varies jointly as its length and the square of its radius. A rod 40cm long and radius 5cm has a mass of 6kg. Find the mass of a similar rod of length 25cm and radius 8cm (4marks)
6.	1994 Q2 P2 The frequency of vibration of a given string is directly proportional to the square root of the tension T and inversely proportional to the length l and to the diameter d. If t is increased by 50% and l is halved, calculate the percentage change in the frequency (4marks)
7.	1994 Q13 P2 The sides of a square are decreases by 5%. By what percentage is the area decreased? (2marks)
8.	1995 Q15 P2 Two variables P and L are such that P varies partly as L and partly as the square root of L. Determine the relationship between P and L when $L = 16$, $P = 500$ and when $L = 25$, $P = 800$. (5 marks)

9.	<p>1996 Q2 P2</p> <p>The electrical resistance , R ohms, of a wire of a given length is inversely proportion to the square of the diameter of the wire, d mm.</p> <p>If $r=2.0$ ohms when $d=3$mm, find the value of R when $d=4$mm (3marks)</p>
10	<p>1997 Q21 P2</p> <p>The volume $v\text{cm}^3$ of a solid depends partly on r^2 and partly on r^3 where r cm is one of the dimensions of the solid. When $r = 1$, the volume is 54.6 cm^3 and</p> <p style="padding-left: 40px;">When $r = 2$, the volume is 226.8cm^3</p> <p>(a) Find the expression for v in terms of r</p> <p>(b) Calculate the volume of the solid when $r = 4$</p> <p>(c) Find the value of r for which the two parts of the volume are equal</p>
11	<p>1998 Q9 P1</p> <p>A quantity T is partly constant and partly varies as the square root of S.</p> <p>a) Using constants a and b, write down an equation connecting T and S.</p> <p>b) If $S = 16$, when $T = 24$ and $S = 36$ when $T = 32$, find the values of the constants a and b,</p>
12	<p>2000 Q20 P2</p> <p>The charge, C shillings per person for a certain seminar is partly fixed and partly inversely proportional to the total number N of people.</p> <p>(a) Write down the expression for C in terms of N</p> <p>(b) When 100 people attended the charge is Kshs 8,700 per person while for 35 people the charge is Ksh. 10,000 per person</p> <p>(c) If a person had paid the full amount and does not attend, the fixed charge is refunded. A group of people paid but ten per cent of them did not attend. After the refund the organizer remained with Kshs 574,000. Find the number of people initially in the group.</p>
13	<p>2001 Q4 P2</p> <p>Two valuables A and B are such that A varies partly as the square of B. Given that A 30, when B =9, and A= 16 when B=14, Find A and B = 36.</p>
14	<p>2002 Q14 P1</p> <p>A quantity P is partly constant and partly varies inversely as a quantity q. Given that $P=10$ when $q=1.5$ and $p = 20$ when $q = 1.25$, find the value of p when $q = 0.5$</p>
15	<p>2003 Q16 P2</p> <p>A distance s metres of an object varies with time t seconds and partly with the square root of the time. Give that $s = 14$ when $t = 9$, write an equation connecting s and t.</p>

16	<p>2004 Q23 P2</p> <p>Three quantities P,Q and R are such that P varies directly as the square of Q and inversely as the square root of R.</p> <p>(a) Given that $P = 20$ when $Q = 5$ and $R = 9$, find P when Q and $R = 25$</p> <p>(b) If Q increases by 20% and decreases by 36%, find the percentage Increase in P.</p>
17	<p>2005 Q14 P2</p> <p>The density of a solid spherical ball varies directly as its mass and inversely as the cube of its radius. When the mass of the ball is 500g and the radius is 5 cm, its density is 2 g per cm^3</p> <p>Calculate the radius of a solid spherical ball of mass 540 density of 10g per cm^3</p>
18	<p>2006 Q12 P2</p> <p>Three quantities t, x and y are such that t varies directly as x and inversely as the square root of y. Find the percentage in t if x decreases by 4% when y increases by 44% (4 marks)</p>
19	<p>2007 Q18 P2</p> <p>Given that y is inversely proportional to x^n and k as the constant of proportionality;</p> <p>(a) (i) Write down a formula connecting y, x, n and k (1 mark)</p> <p>(ii) If $x = 2$ when $y = 12$ and $x = 4$ when $y = 3$, write down two expressions for k in terms of n. Hence, find the value of n and k. (7 marks)</p> <p>(b) Using the value of n obtained in (a) (ii) above, find y when $x = 5^{1/3}$ (2 marks)</p>
20	<p>2008 Q18 P2</p> <p>Three variables p, q and r are such that p varies directly as q and inversely as the square of r.</p> <p>(a) When $p = 9$, $q = 12$ and $r = 2$. Find p when $q = 15$ and $r = 5$ (4mks)</p> <p>(b) Express q in terms of p and r. (1mks)</p> <p>(c) If p is increased by 10% and r is decreased by 10%, find;</p> <p>(i) A simplified expression for the change in q in terms of p and r (3mks)</p> <p>(ii) The percentage change in q. (2mks)</p>
21	<p>2009 Q3 P2</p> <p>The mass of a wire m grams (g) is partly a constant and partly, varies as the square of its thickness t mm. when $t = 2\text{mm}$, $m = 40\text{g}$ and when $t = 3\text{mm}$, $m = 65\text{g}$ (4 marks)</p> <p>Determine the value of m when $t = 4\text{mm}$</p>
22	<p>2010 Q23 P2</p> <p>In a uniform accelerated motion the distance, s meters, traveled in time t seconds varies partly as the time and partly as the square of the time.</p> <p>When the time is 2seconds, the distance traveled is 80 meters and the time is 3 seconds, The distance traveled is 135 meters.</p> <p>a) Express s in terms of t (3 marks)</p> <p>b) Find:</p> <p>i) The distance traveled in 5 seconds; (2 marks)</p> <p>ii) The time taken to travel a distance of 560 metres. (3 marks)</p>

23	<p>2011 Q23 P2</p> <p>The cost c, of producing n items varies partly as n and partly as the inverse of n. To produce two items it cost Ksh 135 and to produce three items it costs Kshs 140. Find;</p> <p>a) the constants proportionality and hence write the equation connecting C and n; (5marks)</p> <p>b) the cost of producing 10 items (2marks)</p> <p>c) the number of items produced at a cost of Ksh 756. (3marks)</p>
24	<p>2012 Q15 P2</p> <p>Three quantities P, Q and R are such that P varies directly as Q and inversely as the square root of R. When $P=8$, $Q=10$ and $R=16$. Determine the equation connecting P, Q and R. (3 marks)</p>