Algebraic Ratio and Proportion

1. $a^2 - 2\sqrt{30} - 11 = 0$; $a > 0$ and $x = \dfrac{\sqrt{2a+3b} + \sqrt{2a-3b}}{\sqrt{2a+3b} - \sqrt{2a-3b}}$

a. if $\dfrac{a^3+b^3}{a-b+c} = a(a+b)$; Prove, a, b, c are in continued proportional.

b. show, $\dfrac{a^6+1}{a^3} = 4\sqrt{6}$

c. Prove, $3bx^2 - 4ax + 3b = 0$

2. i. $\dfrac{1}{p} + \dfrac{1}{q} = \dfrac{8}{x}$ ii. $\dfrac{p^2+q^2}{q^2+r^2} = \dfrac{(p+q)^2}{(q+r)^2}$

a. Find value of x.

b. Find value of $\dfrac{x+4p}{x-4p} + \dfrac{x+4q}{x-4q}$ from (i)

c. From (ii) prove $p : q = q : r$

3. $\dfrac{p+q-r}{p+q} = \dfrac{q+r-p}{q+r} = \dfrac{r+p-q}{r+p}$ and $p+q+r \neq 0$

(a) if $\dfrac{p}{q} = \dfrac{q}{r}$, then show $\left(\dfrac{p-q}{p}\right)^2 = \dfrac{(q-r)}{r}$

b. Prove $p = q = r$

c. if p, q, r are not equal, then show that, the value of each of the given ratio is equal to 2 and $\frac{1}{2}$!

4. The amount of pulse, mustard and paddy produced in a farmers farm are 75 kg, 100 kg and 525 kg, respectively. The grains are sold at price of 100, 120 and 30 taka, respectively. After selling all the grains, calculate the ratio of income from the individual grain

5. if $\frac{a}{b}=\frac{b}{c}=\frac{c}{d}$ show that

a. $\frac{a^3+b^3}{b^3+c^3}=\frac{b^3+c^3}{c^3+d^3}$

b. $(a^2+b^2+c^2)(b^2+c^2+d^2)=(ab+bc+cd)^2$

6. If $\frac{bz-cy}{a}=\frac{cx-az}{b}=\frac{ay-bx}{c}$, prove that $\frac{x}{a}=\frac{y}{b}=\frac{z}{c}$

7. let a man be standing at p 'm' distance from a lightpost, p be the height of a man, s be the shadow length. Determ the height of the light post in terms of p, p, s.

8. In a office, there are 2 officers, 7 clerks and 3 bearers. If a bearer gets TK 1, a clerk gets TK 2 and an officer gets TK 4. Their total salary is TK 150000, What is their individual salary?

9.
$p=26$ m ; $q=10$ m

Considering p as the value of length and q as the value of breadth of a rectangle. If the length of a rectangle is increased by 10% and the breadth is decreased by 20%. What is the percentage of increase or decrease of the A of the triangle?