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Proportion

Ms. Reena

Q1 Using componendo and dividendo, find the value of x

$$\frac{\sqrt{3x+4}+\sqrt{3x-5}}{\sqrt{3x+4}-\sqrt{3x-5}} = 9$$ (Year 2011)

Q2 6 is mean proportional between x and y and 48 is the third proportional of x and y. Find the numbers. (Year 2011)

Q3 If $x = \frac{\sqrt{a+1}+\sqrt{a-1}}{\sqrt{a+1}-\sqrt{a-1}}$, using properties of proportions show that $x^2 - 2ax + 1 = 0$ (Year 2012)

Q4 What number must be added to each of the numbers 6, 15, 20 and 43 to make them proportional? (Year 2013)

Q5 Using the properties of proportion, solve for x, given

$$\frac{x^4+1}{2x^2} = \frac{17}{8}$$ (Year 2013)

Q6 If $\frac{x^2+y^2}{x^2-y^2} = \frac{17}{8}$, then find the value of (i) $x : y$ (ii) $\frac{x^3+y^3}{x^3-y^3}$ (Year 2014)

Q7 If a, b, c are in continued proportion, prove that $(a+b+c)(a-b+c) = a^2+b^2+c^2$ (Year 2015)

Q8: Given $\frac{x^3+12x}{6x^2+8} = \frac{y^3+27y}{9y^2+27}$

Using componendo and dividendo, find $x:y$

(Year 2015)

Q9: If $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$ show that

$$\frac{x^3}{a^3} + \frac{y^3}{b^3} + \frac{z^3}{c^3} = \frac{3xyz}{abc}$$

(Year 2016)

Q10: If b is the mean proportion between a and c, show that

$$\frac{a^4 + a^2b^2 + b^4}{b^4 + b^2c^2 + c^4} = \frac{a^2}{c^2}$$

(Year 2017)

Q11: If $\frac{7m+2n}{7m-2n} = \frac{5}{3}$, use properties of proportion to find:

(i) $m:n$ (ii) $\frac{m^2+n^2}{m^2-n^2}$

(Year 2017)

Q12: Using properties of proportion, solve for x, given that x is positive

$$\frac{2x+\sqrt{4x^2-1}}{2x-\sqrt{4x^2-1}} = 4$$

(Year 2018)

Q13: Using properties of proportion solve for x, given $\frac{\sqrt{5x}+\sqrt{2x-6}}{\sqrt{5x}-\sqrt{2x-6}} = 4$

(Year 2019)

Q14: The following numbers $k+3$, $k+2$, $3k-7$ and $2k-3$ are in proportion. Find k.

(Year 2019)

Q15: If 3, 5, x and $6+x$ are in proportion, find x. (Year 2020)

Q16: Using properties of componendo and dividendo, find the value of x

$$\frac{\sqrt{x+3}+\sqrt{x-5}}{\sqrt{x+3}-\sqrt{x-5}} = 2$$

(Year 2020)

Extra Questions

Q1: If $(4a+5b)(4c-5d) = (4a-5b)(4c+5d)$, prove that a, b, c, d are in proportion.

Q2: If $x = \frac{8ab}{a+b}$, find the value of

$$\frac{x+4a}{x-4a} + \frac{x+4b}{x-4b}$$

Q3: Given that $\frac{a^3+3ab^2}{b^3+3a^2b} = \frac{63}{62}$

Using componendo and dividendo, find $a:b$

Q4: $\frac{\sqrt{x+4}+\sqrt{x-10}}{\sqrt{x+4}-\sqrt{x-10}} = \frac{5}{2}$

Q5: Solve for x

$$\frac{\sqrt{36x+1}+6\sqrt{x}}{\sqrt{36x+1}-6\sqrt{x}} = 9$$

Proportions (Answers)

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1) 7

2) $x = 3,\ y = 12$

4) 3

5) ± 2

6) (i) $\frac{5}{3}$ (ii) $\frac{152}{98}$

8) 2:3

11) (i) 8:7 (ii) $\frac{113}{15}$

12) $\frac{5}{8}, \frac{-5}{8}$

13) $x = 30$

14) $k = 5$ or -1

15) $x = 9$

16) $x = 6$

Extra Questions (Answers)

3) 3:2

4) 13:15

5) $\frac{4}{81}$