$A =$ the coefficient of $x^4$ in the expansion of $\left(x-\sqrt{3}\right)^7$

$B =$ the solution for $3+\sqrt{3x+1}=x$

$C =$ the sum of all odd whole numbers between 13 and 275, inclusive

Find the value of $A+B+C$.

**Question #1** Theta School Bowl 2007 MAΘ National Convention

$A =$ the coefficient of $x^4$ in the expansion of $\left(x-\sqrt{3}\right)^7$

$B =$ the solution for $3+\sqrt{3x+1}=x$

$C =$ the sum of all odd whole numbers between 13 and 275, inclusive

Find the value of $A+B+C$.

$A =$ the value of the resulting expression evaluated for $x = \frac{1}{2}$ when $\frac{x+1}{x-1}$ is replaced for each $x$ in the expression $\frac{x+1}{x-1}$

$B =$ the simplified value of $a+b$ where $y = a + \frac{b}{x}$, $a$ and $b$ are constants, $xy \neq 0$, and the graph contains the points $(-1,1)$ and $(-5,5)$

$C =$ the simplified form using non negative exponents of $x^3\left(2y^{-1}\right)\left(x^2y^{-2}\right)^{-1}$

Find the simplified form of $A \bullet B \bullet C$.

**Question #2** Theta School Bowl 2007 MAΘ National Convention

$A =$ the value of the resulting expression evaluated for $x = \frac{1}{2}$ when $\frac{x+1}{x-1}$ is replaced for each $x$ in the expression $\frac{x+1}{x-1}$

$B =$ the simplified value of $a+b$ where $y = a + \frac{b}{x}$, $a$ and $b$ are constants, and the graph contains the points $(-1,1)$ and $(-5,5)$

$C =$ the simplified form using non negative exponents of $x^3\left(2y^{-1}\right)\left(x^2y^{-2}\right)^{-1}$

Find the simplified form of $A \bullet B \bullet C$.

$A =$ the probability that at least one head is showing when four fair coins are flipped

$B =$ the number of different groups of three kittens that can be chosen from 7 kittens

$C =$ the odds against rain today, written in fractional form, when the probability of rain today is 0.30

Find the value of $\frac{A \bullet C}{B}$.

**Question #3** Theta School Bowl 2007 MAΘ National Convention

$A =$ the probability that at least one head is showing when four fair coins are flipped

$B =$ the number of different groups of three kittens that can be chosen from 7 kittens

$C =$ the odds against rain today, written in fractional form, when the probability of rain today is 0.30

Find the value of $\frac{A \bullet C}{B}$.

$A =$ the sum of the values of $x$ for $\frac{x}{x+6} + \frac{2x+3}{2x^2+12x} = \frac{1}{x-1}$, where defined

$B =$ the value of $x + y$ for the system: $\begin{cases} \frac{1}{4x} + \frac{7}{2y} = \frac{5}{4} \\ \frac{1}{2x} - \frac{3}{y} = -\frac{5}{14} \end{cases}$

Find the value of $A \bullet B$.

**Question #4** Theta School Bowl 2007 MAΘ National Convention

$A =$ the sum of the values of $x$ for $\frac{x}{x+6} + \frac{2x+3}{2x^2+12x} = \frac{1}{x-1}$, where defined

$B =$ the value of $x + y$ for the system: $\begin{cases} \frac{1}{4x} + \frac{7}{2y} = \frac{5}{4} \\ \frac{1}{2x} - \frac{3}{y} = -\frac{5}{14} \end{cases}$

Find the value of $A \bullet B$.

$A =$ the simplified form for $\left(\log\left(5\log\left(100\right)\right)\right)^2$

$B =$ the value of $9^{\log_3 5}$

$C =$ the value of $256^{0.16} \bullet 256^{0.09}$

$D =$ the value of $x$ for $\frac{1}{2}\log_b x - \log_b 4 = \log_b 3$, where $b > 1$

Find the value of $\frac{D}{C} + A \bullet B$.

**Question #5** Theta School Bowl 2007 MAΘ National Convention

$A =$ the simplified form for $\left(\log\left(5\log\left(100\right)\right)\right)^2$

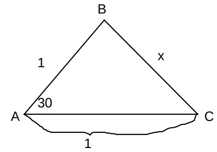
$B =$ the value of $9^{\log_3 5}$

$C =$ the value of $256^{0.16} \bullet 256^{0.09}$

$D =$ the value of $x$ for $\frac{1}{2}\log_b x - \log_b 4 = \log_b 3$, where $b > 1$

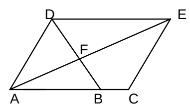
Find the value of $\frac{D}{C} + A \bullet B$.

$R =$ the value of $x^2$ in a triangle with a $30°$ angle included by two sides of length 1 where $x$ is the side opposite the $30°$ angle




$S =$ the value of $A + B + C$ in the equation of the line (in $Ax + By = C$ form, where $A$, $B$, $C$ are relatively prime integers and $A$ is positive) determined by the vertex of $y = -2x^2 + 8x - 5$ and the focus of $y = 3x^2 - 6x + 1$

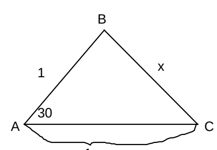
$T =$ the length of $\overline{FE}$ in the diagram of a parallelogram with $AF = 2, AB = 3, BC = 1$




Find the value of $\dfrac{R}{S \bullet T}$.

**Question #6** Theta School Bowl 2007 MAΘ National Convention

$R =$ the value of $x^2$ in a triangle with a $30°$ angle included by two sides of length 1 where $x$ is the side opposite the $30°$ angle




$S =$ the value of $A + B + C$ in the equation of the line (in $Ax + By = C$ form, where $A$, $B$, $C$ are relatively prime integers and $A$ is positive) determined by the vertex of $y = -2x^2 + 8x - 5$ and the focus of $y = 3x^2 - 6x + 1$

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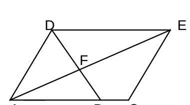


Find the value of $\dfrac{R}{S \bullet T}$.

$A =$ the area of the circle $x^2 + y^2 - 6x + 10y = 0$

$B =$ the distance between the origin and the vertex of the parabola $f(x) = 4x^2 + 16x + 19$

$C =$ the positive value of $K$ that makes the graph of $y = -3x^2 + 2Kx - 12$ tangent to the $x$-axis

Find the value of $\dfrac{A}{B^2 \bullet C - 10}$.

**Question #7** Theta School Bowl 2007 MAΘ National Convention

$A =$ the area of the circle $x^2 + y^2 - 6x + 10y = 0$

$B =$ the distance between the origin and the vertex of the parabola $f(x) = 4x^2 + 16x + 19$

$C =$ the positive value of $K$ that makes the graph of $y = -3x^2 + 2Kx - 12$ tangent to the $x$-axis

Find the value of $\dfrac{A}{B^2 \bullet C - 10}$.

$A =$ the remainder when $x^3 + x^2 - 10x + 8$ is divided by $2x + 10$

$B =$ the 130th term of the arithmetic sequence: 2,5,8,11…

$C =$ the first term, $a_1$, in the arithmetic sequence when $a_{210} = 11280$ and $a_{211} = 11190$

Find the value of $A + B + C$.

**Question #8** Theta School Bowl 2007 MAΘ National Convention

$A =$ the remainder when $x^3 + x^2 - 10x + 8$ is divided by $2x + 10$

$B =$ the 130th term of the arithmetic sequence: 2,5,8,11…

$C =$ the first term, $a_1$, in the arithmetic sequence when $a_{210} = 11280$ and $a_{211} = 11190$

Find the value of $A + B + C$.

$A =$ the $y$-coordinate of the point where the graphs of $y = 2 - \log_2(x-2)$ and $y = -1 + \log_2 x$ intersect

$B =$ the sum of the $x$-coordinates of the points of intersection of $x^2 - y^2 = 1$ and $2x - y = 3$

Find the value of $A \bullet B$.

**Question #9** Theta School Bowl 2007 MAΘ National Convention

$A =$ the $y$-coordinate of the point where the graphs of $y = 2 - \log_2(x-2)$ and $y = -1 + \log_2 x$ intersect

$B =$ the sum of the $x$-coordinates of the points of intersection of $x^2 - y^2 = 1$ and $2x - y = 3$

Find the value of $A \bullet B$.

$A =$ the value of $g(12)$ when $g(2x) = x + g(2x-1)$ and $g(11) = 1$

$B =$ the value of $a$ when $f(x) = 2x+1$ and $f(3a-10) = 5$

$C =$ the value of $f^{-1}(4)$ when $f(x) = -3x+5$

Find the value of $\frac{A \bullet B}{C}$.

**Question #10** Theta School Bowl 2007 MAΘ National Convention

$A =$ the value of $g(12)$ when $g(2x) = x + g(2x-1)$ and $g(11) = 1$

$B =$ the value of $a$ when $f(x) = 2x+1$ and $f(3a-10) = 5$

$C =$ the value of $f^{-1}(4)$ when $f(x) = -3x+5$

Find the value of $\frac{A \bullet B}{C}$.

$A =$ the volume of a right circular cone with a height of 8 inches that is circumscribed about a sphere with a radius of 3 inches

$B =$ the $m\angle BOC$ in degrees when in $\Delta ABC$, $AB = BC, m\angle A = 40°$ and point O is within the triangle with $\angle OBC \cong \angle OCA$

$C =$ the area of the region bounded by a circle inscribed in a regular hexagon and a circle circumscribed about the same hexagon where the side of the hexagon is 4

Find the value of $\dfrac{A \bullet B}{C}$.

**Question #11** Theta School Bowl 2007 MAΘ National Convention

$A =$ the volume of a right circular cone with a height of 8 inches that is circumscribed about a sphere with a radius of 3 inches

$B =$ the $m\angle BOC$ in degrees when in $\Delta ABC$, $AB = BC, m\angle A = 40°$ and point O is within the triangle with $\angle OBC \cong \angle OCA$

$C =$ the area of the region bounded by a circle inscribed in a regular hexagon and a circle circumscribed about the same hexagon where the side of the hexagon is 4

Find the value of $\dfrac{A \bullet B}{C}$.

Find the ordered triple $(A, B, C)$ so that: $\frac{6x^2+14x-20}{x(x^2-4)}=\frac{A}{x}+\frac{B}{x+2}+\frac{C}{x-2}$

**Question #12** Theta School Bowl 2007 MAΘ National Convention

Find the ordered triple $(A, B, C)$ so that: $\frac{6x^2+14x-20}{x(x^2-4)}=\frac{A}{x}+\frac{B}{x+2}+\frac{C}{x-2}$

Express as a single simplified fraction with no negative exponents, where $|a|,|b| \neq 0$

$$\frac{a^{-1}+b^{-1}}{\left(\frac{1}{a^{-1}}+\frac{1}{b^{-1}}\right)^{-1}}$$

**Question #13** Theta School Bowl 2007 MAΘ National Convention

Express as a single simplified fraction with no negative exponents, where $|a|,|b| \neq 0$

$$\frac{a^{-1}+b^{-1}}{\left(\frac{1}{a^{-1}}+\frac{1}{b^{-1}}\right)^{-1}}$$

Simplify the expression where defined

$$\frac{x^3 - 27}{18 - 2x^2} \div \frac{5x^2 + 15x + 45}{10x^2 - 20x - 150}$$

**Question #14** Theta School Bowl 2007 MAΘ National Convention

Simplify the expression where defined

$$\frac{x^3 - 27}{18 - 2x^2} \div \frac{5x^2 + 15x + 45}{10x^2 - 20x - 150}$$