1. (3x – 1) – 4 (3x – 1) = (x+2)(x-2)(3x-1); x = -2, 2, 1/3; A = -2 + 2 + 1/3 = 1/3; B = - 0.5+ 0.5 + 3 = 3; C = (2)(-2)(1/3) = - 4/3; D = 4 + 4 + 1/9 = 73/9; = - 4 + 73 = 69

2. A 36 $54\sqrt{3} = 6\frac{s^2\sqrt{3}}{4}; s = 6, perimeter = 36$

B 9 The area of the triangle is $\frac{1}{2} \bullet 18 \bullet h$. The area of the trapezoid is $\frac{1}{2}h(b_1 + b_2)$. Since these areas are equal, set the expressions equal giving $\frac{1}{2}\not{h}(b_1 + b_2) = \frac{1}{2} \bullet 18 \bullet \not{h}$.

The median is found by $\frac{1}{2}(b_1 + b_2)$ which is what we have on the left hand side of the equation which makes that equal to 9.

C 4016 The hypotenuse will be the longest side. Let the side opposite the $30°$ angle be *x*. That makes the hypotenuse $x + 2008$. Since the side opposite the $30°$ angle is half the hypotenuse, $x = \frac{1}{2}(x + 2008); x = 2008$ which makes the hypotenuse 4016.

D 152 We need to find the least number of sides of a polygon that has a sum of all angles greater than 2008. So by guess and check, we see that a 14 sided polygon has total degrees 2160. 2160 – 2008 = 152. Note: For any polygon with greater than 14 sides, the final angle would be greater than 180 since the polygon is convex.

$C - (A + B + D) = 4016 - (36 + 9 + 152) = 3819$

3. $\left[\frac{1}{5} + \frac{1}{12} + \frac{1}{6}\right]t = 1;$ $\left(\frac{27}{60}\right)t = 1;$ $t = \frac{60}{27}$ hr. Convert to minutes $\frac{60}{27}(60) = 133.\overline{3};$

Nearest minute: 133

4. $x^2 + 10x + 25 + y^2 - 16y + 64 = -53 + 25 + 64$ Center is A = (-5,8)

$x^2 + 4x - 12y + 16 = 0;$ $x^2 + 4x + 4 = 12y + 4 - 16;$ $\frac{1}{12}(x+2)^2 = y - 1;$ p=3 Vertex is (-2,1) B = (-2,4)

The length of line segment AB is $\sqrt{(-2 - -5)^2 + (4 - 8)^2} = 5$

$x^2 + y^2 - 8x + 14y + 1 = 0;$ $x^2 - 8x + 16 + y^2 + 14y + 49 = -1 + 16 + 49;$ $r^2 = 64;$ D = 16 5(16) = 80

5. A 1:1 SA of a sphere = $4\pi r^2$. Since the radius of the cylinder is r, and the sphere is inscribed in the cylinder, the height of the cylinder would be the diameter of the sphere which is *2r.* Lateral area of the circumscribed right cylinder = $2\pi r \bullet 2r = 4\pi r^2$. Since these two are the same, the ratio is 1:1.

B $\frac{3\sqrt{3}}{4}$ Let the length of the wire be $12x$ (since that's divisible by 3 and 4, the number of sides of the polygons). A side of the square would be $3x$ making the area $9x^2$. A side of the triangle is $4x$ making the area $\frac{16x^2\sqrt{3}}{4} = 4x^2\sqrt{3}$. The ratio of the area of the square to the area of the triangle is $\frac{9\cancel{x^2}}{4\cancel{x^2}\sqrt{3}}$. Rationalizing this gives $\frac{3}{4}\sqrt{3}$.

C $\frac{2}{3}\sqrt{2}$ Since we only want the ratio of the perimeters, we can use the ratio of the areas as the areas. The side of the square is 2, making the perimeter 8. The area of the hexagon is $3\cancel{\sqrt{3}} = \frac{6s^2\cancel{\sqrt{3}}}{4}; s^2 = 3 \bullet \frac{4}{6}; s^2 = 2, s = \sqrt{2}$ making the perimeter of the hexagon $6\sqrt{2}$.

The ratio of the perimeters would be $\frac{8}{6\sqrt{2}}$ which simplified and rationalized is $\frac{2}{3}\sqrt{2}$.

D $\frac{16\pi\sqrt{2}}{3}$ The arc length of the $120°$ sector with radius 6 is $\frac{1}{3}\bullet 12\pi$ or 4π which is the circumference of the base of the cone. The base circumference of the cone is 4π making the radius of the base equal to 2. To find the height of the cone, use the right triangle formed by the radius, height and slant height of the cone. The slant height is 6, the radius is 2, making the height $4\sqrt{2}$. Now we can find the volume of the cone which is $\frac{1}{3}Bh = \frac{1}{3}\bullet 4\pi \bullet 4\sqrt{2}; V = \frac{16\pi\sqrt{2}}{3}$.

$$A \bullet 4B \bullet \frac{1}{C} \bullet \frac{D}{\pi} = \frac{1}{1}\bullet\left(4 \bullet \frac{3\sqrt{3}}{4}\right)\bullet \frac{1}{\frac{2\sqrt{2}}{3}} \bullet \frac{\frac{16\cancel{\pi}\sqrt{2}}{3}}{\cancel{\pi}} = 1 \bullet 3\sqrt{3} \bullet \frac{\cancel{3}}{\cancel{2}\cancel{\sqrt{2}}} \bullet \frac{\cancel{16}\cancel{\sqrt{2}}}{\cancel{3}} = 24\sqrt{3}.$$

6. Keep dividing 2008 by 5, and add the integral quotients until the quotient is zero. A=401+80+16+3=500

$2008 = \left(2^3\right)\left(251^1\right)$, so by the counting principle B= $\left(3+1\right)\left(1+1\right) = 8$

Starting with $44^2 = 1936$, use trial and error to find that C=1936.

$\frac{{}_nC_r}{{}_nC_{n-r}} = 1$ so D = $\frac{{}_{2008}C_{1474}}{{}_{2008}C_{534}}$ =1. $A+B+C+D = 500+8+1936+1 = 2445$

7. $2\log_9 x - \frac{54}{\log_9 x} = 3$ Multiply both sides by $\log_9 x$ and put the terms in order to factor.

$$2\left(\log_9 x\right)^2 - 3\log_9 x - 54 = 0;\ \left(2\log_9 x + 9\right)\left(\log_9 x - 6\right) = 0;\ \log_9 x = -\frac{9}{2} \text{ or } \log_9 x = 6$$

$$x = 9^{\frac{-9}{2}} \text{ or } x = 9^6;\ A = 9^{\frac{-9}{2}} \cdot 9^6 = 9^{\frac{3}{2}} = 27$$

$$\left(\frac{4}{9}\right)^{(B+6)} = \left(\frac{243}{32}\right)^{(3-B)};\ \left(\frac{2}{3}\right)^{2B+12} = \left(\frac{3}{2}\right)^{15-5B};\ 2B+12 = -15+5B;\ 27 = 3B;\ B = 9$$

$$CD = \frac{3\log 2}{\log 3}\cdot\frac{4\log 3}{5\log 2} = \frac{12}{5};\ \text{Therefore } \frac{5\text{ACD}}{\text{B}} = 36$$

8. $A=\left(\frac{6}{13}\right)\left(\frac{5}{12}\right)=\frac{5}{26}$. $B=$ prob(red, then white)) = $\left(\frac{4}{13}\right)\left(\frac{2}{12}\right)=\frac{2}{39}$.

C = prob(red, then black) + prob(black, then red) = $\left(\frac{2}{13}\right)\left(\frac{6}{12}\right)+\left(\frac{6}{13}\right)\left(\frac{2}{12}\right)=\frac{2}{13}$.

$D=\left(\frac{9}{13}\right)\left(\frac{8}{12}\right)=\frac{6}{13}$. $\frac{A+C}{B+D}=\frac{9}{26}\bullet\frac{39}{20}=\frac{27}{40}$

9. A 78 When an angle bisector is drawn, it makes the sides proportional to the segments of the third side. $\frac{2x-4}{2x-12}=\frac{x+5}{x}, x=30. AB=48, BC=30, AC=78$

B 4π Graphing both we have a sector of a circle. The graph of $y=|x|$ is a V and the angle formed is a right angle so we have $\frac{1}{4}$ of the circle. The radius of the circle is 4 so $\frac{1}{4}\bullet 16\pi=4\pi.$

C $\frac{5}{2}$ Drawing one of the segments from a vertex to the midpoint of a side, we have A right triangle with one leg the side of the square and the other leg is $\frac{1}{2}$ a side of the square. So now use Pythagorean Theorem with $\sqrt{5}$ and $\frac{\sqrt{5}}{2}$ so

$$\left(\sqrt{5}\right)^2+\left(\frac{\sqrt{5}}{2}\right)^2=c^2, 5+\frac{5}{4}=c^2, c=\sqrt{\frac{25}{4}}=\frac{5}{2}.$$

D: 17π In a circle draw the diameter and the chord so that they are perpendicular. The diameter bisects the chord making each part have a measure of 4. The distance from the point of intersection to the circle is 1, let the remainder of the diameter be *x*. Using the two chord power theorem, $4\bullet 4=x\bullet 1; x=16$. Then the diameter is 17 making the circumference 17π

$$A\bullet C+\frac{B+D}{\pi}=78\bullet\frac{5}{2}+\frac{4\pi+17\pi}{\pi}=195+21=216$$

10.

$s(t)=-16t^2+128y+144$; time when ball is at highest point is vertex;

complete square: s-144 -256= -16(t-8t +16); s-400=-16(t-4)^2;

$A=4; C=400;$ Factor to find where the distance is 0; -16(t^2-8t-9); B=9; $\sqrt{ABC}=\sqrt{(400)(4)(9)}=120$

11. $\sqrt{\frac{10!}{2!}}=\sqrt{(10)(9)(8)(7)(6)(5)(4)(3)}=360\sqrt{14}$ A = 360; B = 14; C = -203 + 55(11) = 402

D = $\dfrac{15}{1-\frac{2}{7}} = 15\left(\dfrac{7}{5}\right) = 21$; $360 - \dfrac{402 \bullet 14}{21} = 360 - 268 = 92$

12. Slope of line $\overline{AB}$ = $\dfrac{12-3}{-5+8} = 3$; Slope of $\perp$ line $= -\dfrac{1}{3}$; Equation of perpendicular line through (-5, 12) is x + 3y = 31. Solve system to find point of intersection: (7, 8) C + D =+ 15

13. A = 130; $B = \sqrt{(8)(2048)} = 128$; $C = \dfrac{2(50)(75)}{50+75} = 60$; $60(130-128) = 120$

14. Use synthetic division or the Factor Theorem {-5, -2, -1, 3, 5}

15. A = 2; B = 8, C = 6, D = -2; determinant value = - 52