1. The formula for electrical power, P, is $P = I^2R$, where I is current and R is resistance. The formula for I in terms of P and R is

A. $I = \left(\frac{P}{R}\right)^2$ B. $I = \sqrt{\frac{P}{R}}$

C. $I = (P - R)^2$ D. $I = \sqrt{P - R}$

$\frac{P}{R} = \frac{I^2R}{R}$ $\sqrt{I^2} = \sqrt{\frac{P}{R}}$ $I = \sqrt{\frac{P}{R}}$

2. Students were asked to write a formula for the length of a rectangle by using the formula for its perimeter, $p = 2l + 2w$. Three of their responses are shown below.

i. $l = \frac{1}{2}p - w$
ii. $l = \frac{1}{2}(p - 2w)$
iii. $l = \frac{p - 2w}{2}$

$\frac{1}{2}(p-2w)$ $\frac{1}{2}p - w$

Which responses are correct?

A. I and II, only B. II and III, only

C. I and III, only D. I, II, and III

$P = 2l + 2w$ $P - 2w = 2l$ $\frac{1}{2}(P-2w) = l$

$\frac{P-2w}{2} = \frac{2l}{2}$

$\frac{1}{2}P - \frac{2}{2}w = \frac{2l}{2} = \frac{1}{2}p - w = l$

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3. Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula $P_1V_1 = P_2V_2$. When the formula is solved for P_2, the result is

A. $P_1V_1V_2$ B. $\frac{V_2}{P_1V_1}$

C. $\frac{P_1V_1}{V_2}$ D. $\frac{P_1V_2}{V_1}$

$\frac{P_1V_1}{V_2} = \frac{P_2V_2}{V_2}$

4. The formula for blood flow rate is given by $F = \frac{p_1 - p_2}{r}$, where F is the flow rate, p_1 the initial pressure, p_2 the final pressure, and r the resistance created by blood vessel size. Which formula can *not* be derived from the given formula?

A. $p_1 = Fr + p_2$ B. $p_2 = p_1 - Fr$

C. $r = F(p_2 - p_1)$ D. $r = \frac{p_1 - p_2}{F}$

$r \cdot F = \frac{P_1 - P_2}{r} \cdot r$

$\frac{Fr}{F} = \frac{P_1 - P_2}{F} \rightarrow Fr = P_1 - P_2$

$Fr + P_2 = P_1$

$r = \frac{P_1 - P_2}{F}$

$Fr = P_1 - P_2$

$Fr - P_1 = -P_2$

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5. Michael borrows money from his uncle, who is charging him simple interest using the formula $I = Prt$. To figure out what the interest rate, r, is, Michael rearranges the formula to find r. His new formula is r equals

A. $\frac{I-P}{t}$ B. $\frac{P-I}{t}$ C. $\frac{I}{Pt}$ D. $\frac{Pt}{I}$

$\frac{I = Prt}{Pt \quad Pt}$

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6. The formula for converting degrees Fahrenheit (F) to degrees Kelvin (K) is:

$$K = \tfrac{5}{9}(F + 459.67)$$

Solve for F, in terms of K.

$\frac{9}{5}K = \frac{5}{9}(F + 459.67)$

$\frac{9}{5}K = F + 459.67$

$-459.67 \quad -459.67$

$\frac{9}{5}K - 459.67 = F$

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7. The formula $F_g = \frac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

$r^2 \cdot F_g = \frac{GM_1M_2}{r^2} \cdot r^2$

$F_g r^2 = GM_1M_2$

$-F_g \quad -F_g$

$\sqrt{r^2} = \sqrt{GM_1M_2 - F_g}$

$r = \sqrt{GM_1M_2 - F_g}$

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8. Using the formula for the volume of a cone, express r in terms of V, h, and n.

* Given on formula Sheet on final Exam

$3 \cdot V = \frac{1}{3}\pi r^2 h$

$\frac{3V}{\pi h} = \frac{\pi r^2 h}{\pi h}$

$\sqrt{\frac{3V}{\pi h}} = \sqrt{r^2}$

$r = \sqrt{\frac{3V}{\pi h}}$

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9. Solve the equation below for x in terms of a.

$4(ax + 3) - 3ax = 25 + 3a$

$4ax + 12 - 3ax = 25 + 3a$

$ax + 12 = 25 + 3a$

$-12 \quad -12$

$\frac{ax}{a} = \frac{13 + 3a}{a}$

$x = \frac{13 + 3a}{a}$

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10. The formula for the sum of the degree measures of the interior angles of a polygon is $S = 180(n - 2)$. Solve for n, the number of sides of the polygon, in terms of S.

$$\frac{S}{180} = \frac{180(n-2)}{180}$$

$$\frac{S}{180} = n - 2$$

$$+2 \quad +2$$

$$n = \frac{S}{180} + 2$$

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11. Given that $a > b$, solve for x in terms of a and b:

$b(x - 3) \geq ax + 7b$

$$bx - 3b \geq ax + 7b$$

$$+3b \quad +3b$$

$$bx \geq ax + 10b$$

$$-ax \quad -ax$$

$$bx - ax \geq 10b$$

$$\frac{x(b-a)}{b-a} \geq \frac{10b}{b-a}$$

$$x \geq \frac{10b}{b-a}$$

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