

## MAT 012 Lecture Notes, Ch 2.5 & 7.5 (Part 2): Formulas

### Solving a Formula for a Specified Variable

*Ex:* Given the formula for velocity  $v = v_0 + at$  solve for  $a$  ( $a$ : acceleration;  $v_0$ : initial velocity)

*Ex:* Given the formula for the volume of a cone  $V = \frac{1}{3} \pi r^2 h$  solve for  $h$  ( $r$ : radius of the base  
 $h$ : height of the cone)

*Ex:* Given the formula for speed (rate of travel)  $r = \frac{d}{t}$  solve for  $t$  ( $d$ : distance;  $t$ : time)

*Ex:* Given the formula for the forces on a beam  $W = \frac{L(dL + 2P)}{8}$  solve for  $P$

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*Ex:* Given the formula  $\frac{5x+h}{a} = \frac{c}{t}$  solve for  $x$

*Ex:* Given the formula  $\frac{1}{v} - \frac{1}{3} = \frac{1}{x}$  solve for  $x$

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**Extra Practice:** Solve the following equations (formulas) for the specified variable:

- 1)  $E = mc^2$  for  $m$  (formula in physics)
- 2)  $\frac{x-b}{a} = 9$  for  $x$
- 3)  $3r + y = 8s$  for  $r$
- 4)  $A = \frac{Rt}{PV}$  for  $t$  (formula in jet engine design)
- 5)  $W = T(S_1 - S_2) - Q$  for  $S_1$  (formula in refrigeration)
- 6)  $y = mx + b$  for  $m$  (Equation of a line)
- 7)  $A = \frac{1}{2}bh$  for  $h$  (Area of a triangle)
- 8)  $P = s_1 + s_2 + s_3$  for  $s_3$
- 9)  $F = \frac{9}{5}C + 32$  for  $C$  (Conversion from degrees Celsius to Fahrenheit)
- 10)  $S = 2\pi r h + 2\pi r^2$  for  $h$  (Surface area of a cylinder)
- 11)  $I = \frac{nE}{nr + R}$  for  $R$  [Note:  $r$  and  $R$  are two different variables]
- 12)  $A = P(1 + nr)$  for  $n$  (Formula in finance;  $r$  stands for the APR as a decimal)
- 13)  $\frac{3x-t}{a} = \frac{p}{c}$  for  $x$
- 14)  $S = \frac{a}{1-r}$  for  $r$
- 15) After  $t$  seconds, a stone thrown upward with a velocity of  $v$  meters/second and with an acceleration due to gravity will be  $s$  meters above the ground, where  $s = vt - \frac{1}{2}at^2$ .  
Solve for  $v$ .

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### ANSWERS for Extra Practice

$$1. m = \frac{E}{c^2}$$

$$2. x = 9a + b$$

$$3. r = \frac{8s - y}{3} \quad \text{same as } r = \frac{8}{3}s - \frac{1}{3}y$$

$$4. t = \frac{APV}{R} \quad \text{same as } t = \frac{PVA}{R}$$

$$5. S_1 = \frac{W + TS_2 + Q}{T} \quad \text{same as } S_1 = \frac{W + Q}{T} + S_2$$

$$6. m = \frac{y - b}{x}$$

$$7. h = \frac{2A}{b} \quad \text{same as } h = \frac{A}{\frac{1}{2}b}$$

$$8. s_3 = P - s_1 - s_2$$

$$9. C = \frac{5}{9}(F - 32) \quad \text{same as } C = \frac{F - 32}{\frac{9}{5}} \quad \text{same as } C = \frac{5F - 160}{9} \quad \text{same as } C = \frac{5}{9}F - \frac{160}{9}$$

$$10. h = \frac{S - 2\pi r^2}{2\pi r} \quad \text{same as } h = \frac{S}{2\pi r} - r$$

$$11. R = \frac{nE - Inr}{I} \quad \text{same as } R = \frac{nE}{I} - nr$$

$$12. n = \frac{A - P}{Pr} \quad \text{same as } n = \frac{A}{Pr} - \frac{1}{r} \quad \text{same as } n = \frac{\frac{A}{P} - 1}{r}$$

$$13. x = \frac{ap + ct}{3c} \quad \text{same as } x = \frac{ap}{3c} + \frac{t}{3} \quad \text{same as } x = \frac{\frac{ap}{c} + t}{3}$$

$$14. r = \frac{S - a}{S} \quad \text{same as } r = 1 - \frac{a}{S} \quad \text{same as } r = \frac{a - S}{-S} \quad \text{same as } r = \frac{\frac{a}{S} - 1}{-1}$$

$$15. v = \frac{s + \frac{1}{2}at^2}{t} \quad \text{same as } v = \frac{s}{t} + \frac{1}{2}at \quad \text{same as } v = \frac{s}{t} + \frac{at}{2}$$