4.4 – Modeling With Formulas Worksheet
MPM1D
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1. Rearrange each formula to isolate the variable indicated.

a) $P = 4s$ for s

b) $A = P + I$ for P

c) $C = 2\pi r$ for r

c) $y = mx + b$ for b

2. Rearrange each formula to isolate the variable indicated.

a) $d = mt + b$ for m

b) $P = 2l + 2w$ for w

c) $a = \frac{v}{t}$ for v

d) $v = \frac{d}{t}$ for t

e) $A = \pi r^2$ for r f) $P = I^2 R$ for I

3. You can use the formula $C = 2.5I$ to obtain an approximate value for converting a length, I, in inches to a length, C, in centimetres.

a) Use the formula to find the number of centimetres in

     i) 6 inches   ii) 3 feet (1 foot = 12 inches)

b) Rearrange the formula to express I in terms of C.

c) How man inches are in

     i) 75 cm   ii) 1 m

4. Kwok is a hotel manager. His responsibilities include renting rooms for conferences. The hotel charges $250 per day plus $15 per person for the grand ballroom.

a) Create a formula that relates the cost, C, in dollars, of renting the ballroom to the number of people, n.

b) How much should Kwok charge to rent the hall for:

    i) 50 people   ii) 100 people

c) Rearrange your formula to express n in terms of C.

d) How many people could attend a wedding reception if the wedding planners have a budget of:

    i) $4000   ii) $2000

5. The area, A, of a square is related to its perimeter, P, by the formula $A = \frac{P^2}{16}$

a) Rearrange this formula to express P in terms of A.

b) Find the perimeter of a square with area:

    i) 25 cm²   ii) 50 cm²

6. Sometimes the same formula can have many different forms. $PV = nRT$ is a useful formula in chemistry. It relates the characteristics of a gas:

Variable	Characteristic
P	pressure
V	volume
R	universal gas constant
n	number of moles, or how much gas there is
T	temperature

Rearrange this formula to isolate each variable:

7. The distance an accelerating object travels is related to its initial speed, v, its rate of acceleration, a, and time, t:

$$d = vt + \frac{1}{2}at^2$$

a) Rearrange this formula to isolate v.

b) An object travels 30 m while accelerating at a rate of 6 m/s² for 3 seconds. What was its initial speed?

Answers:

1) a) $s = \frac{P}{4}$ b) $P = A - I$ c) $r = \frac{C}{2\pi}$ d) $b = y - mx$

2) a) $m = \frac{d-b}{t}$ b) $w = \frac{P-2l}{2}$ c) $v = at$ d) $t = \frac{d}{v}$ e) $r = \sqrt{\frac{A}{\pi}}$ f) $I = \sqrt{\frac{P}{R}}$

3) a) i) 15 cm   ii) 90 cm   b) $I = \frac{C}{2.5}$ c) i) 30 inches   ii) 40 inches

4) a) $C = 15n + 250$ b) i) $1000   ii) $1750   c) $n = \frac{C-250}{15}$ d) i) 250 ppl   ii) 116 ppl

5) a) $P = \sqrt{16A}$ b) i) 20 m   ii) 28.3 m

6) $P = \frac{nRT}{V}$; $V = \frac{nRT}{P}$; $n = \frac{PV}{RT}$; $R = \frac{PV}{nT}$; $T = \frac{PV}{nR}$; $P = \frac{nRT}{V}$

7) a) $v = \frac{d}{t} - \frac{at}{2}$ b) 1 m/s