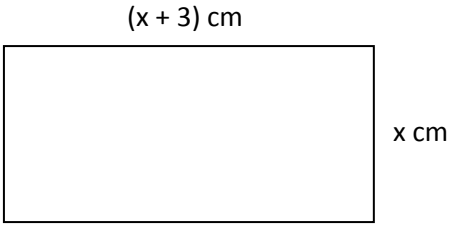
Formulae Handout

1. One side of this rectangle is three centimeters longer than the other:
   Find a formula for the area (A) in square centimeters, and the perimeter (P) in centimeters.



   Area = x(x + 3) Per = 2(x + x + 3)

   $= x^2 + 3x$ = 4x + 6

2. A taxi company uses the following rule to calculate their fares.
   Fare = $2.50 plus $0.50 per kilometer.
   a) How much is the fare for a journey of 3km?
      $2.50 + 3($0.50) = $4
   b) Farook pays $9.00 for a taxi ride. How far was the journey?
      $9 - $2.50 = $6.50
      $6.50 ÷ $0.50 = 13km
   c) Maisy knows that her house is 5 kilometers from town. She has $5.50 left in her purse after a night out. Has she got enough for a taxi ride home?
      $2.50 + 5($0.50) = $5
      She has enough money.

3. Rearrange the following formulae to get the letter in the brackets subject of the formula.

a. T = 3k (k)

$k = {}^{T}/_{3}$

b. $Q = \frac{p}{3}$ (p)

p = 3Q

c. A = 4r + 9 (r)

A – 9 = 4r

$r = \frac{A-9}{4}$

d. $t = m^2$ (m)

$m = \sqrt{t}$

e. C = 2πr (r)

$r = {}^{C}/_{2\pi}$

f. P = 2l + 2w (l)

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

g. $m = p^2 + 2$ (p)

$\sqrt{(m-2)} = p$

h. $A = \frac{1}{4}\pi d^2$ (d)

$d = \sqrt{\frac{4A}{\pi}}$

i. $W = 3n + t$ (n)

$n = \frac{W - t}{3}$

j. $T = 5r^2$ (r)

$r = \sqrt{\frac{T}{5}}$

4. $a^2 + b^2 = c^2$

   a. Find a if $b = 6.0$ and $c = 6.5$

      $a = 2.5$

   b. Make a the subject

      $a = \sqrt{(c^2 - b^2)}$

5. $a = \frac{b+2}{c}$

   a. Make b the subject

      $ac - 2 = b$

   b. Make c the subject

      $c = \frac{b-2}{a}$

6. $d = \frac{12}{1+\sqrt{e}}$

   Make e the subject

   $d(1 + \sqrt{e}) = 12$

   $d + d\sqrt{e} = 12$

d $\sqrt{}$e= 12 – d

$$\sqrt{e} = \frac{12-d}{d}$$

$$e = \left(\frac{12-d}{d}\right)^2$$

7. $T = 2\pi\sqrt{\frac{L}{G}}$

   a. Make *L* the subject

$$\frac{T}{2\pi} = \sqrt{\frac{L}{G}}$$

$$\left(\frac{T}{2\pi}\right)^2 = \frac{L}{G}$$

$$G\left(\frac{T}{2\pi}\right)^2 = L$$

   b. Show that $G = L\left(\frac{2\pi}{T}\right)^2$

$$G = \frac{L}{\left(\frac{T}{2\pi}\right)^2}$$

$$G = L\left(\frac{2\pi}{T}\right)^2$$

8. D = $\pi R^2 - \pi r^2$

   a. Make *R* the subject

   D +πr^2 = πR^2

$$\sqrt{\frac{D+\pi r^2}{\pi}} = R$$

b. Make *r* the subject

$\pi r^2 = \pi R^2 - D$

$$\sqrt{\frac{\pi R^2 - D}{\pi}} = r$$

c. Make π the subject

$D = \pi (R^2 - r^2)$

$$\frac{D}{R^2 - r^2} = \pi$$

9. $uv = fu + fv$ is a formula used in optics.
   a. Find *f* if u = 20 and v = 30

      f = 12

   b. Make *f* the subject

      uv = f(u + v)

      $$\frac{uv}{u+v} = f$$

   c. Make *u* the subject

      uv – fu = fv

      u(v – f) = fv

      $$\frac{fv}{v-f} = u$$

   d. Make *v* the subject

      uv – fv = fu

      v(u – f) = fu

      $$\frac{fu}{u-f} = v$$