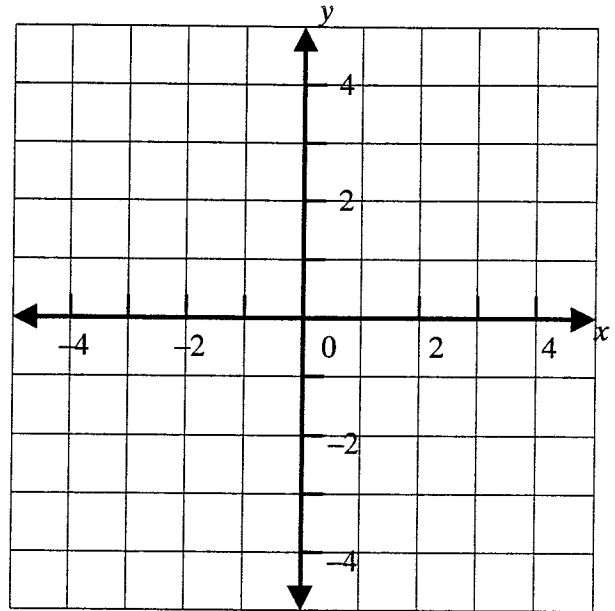# PREPARATORY PRELIMINARY MATHEMATICS
WORKSHEET #2

COURSE/LEVEL
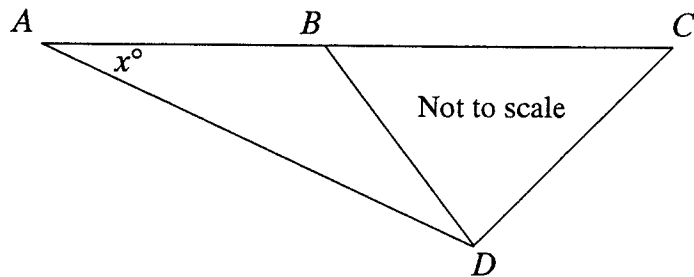NSW Secondary High School Year 11 Preliminary Mathematics.

1. Mark the region corresponding to the inequality, $2x - y < 1$, on the grid.

2. Find the gradient of the line which passes through the points $(0, -3)$ and $(-1, 1)$ on the number plane.

3. Give an expression for x in terms of k, if $(x - k)^2 = 1$.

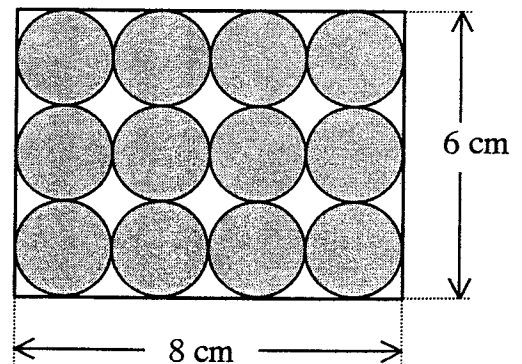4. ACD is a triangle and point B lies on side AC such that $AB = BD = BC = CD$

    Find angle BAD $(x°)$:

Not to scale

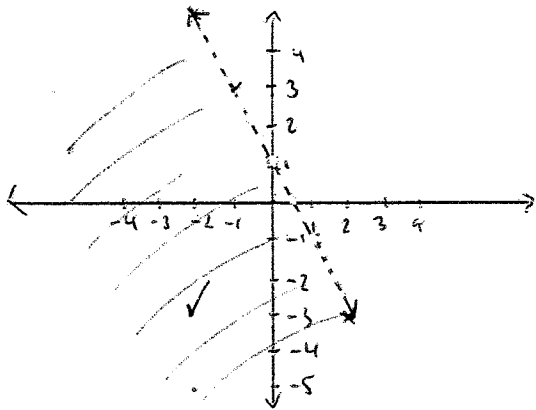5. Solve for x and y where: $4x - y = 1$ and $3y - 6x = -1$.

6. The diagram shows a rectangle 8 cm long and 6 cm wide. It contains 12 shaded circles packed closely together in rows. Each circle has a radius of 1 cm.

    What fraction of the area of the rectangle lies **outside the shaded circles**? Give your answer in exact form.

6 cm

8 cm

1)

$2x - y < 1$

$2x - y = 1$

$y = -2x + 1$

x	-2	-1	0	1	2
y	5	3	1	-1	-3

Test point $(0,0)$ into $2x - y < 1$ ✓

$0 < 1$ (True)

2) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-3-1}{0+1}$

$= -\dfrac{4}{1}$

$= -4$ ✓

3) $(x-k)^2 = 1$

$x^2 - 2k + k^2 = 1$

$x^2 = 2k - k^2 + 1$ ✓

$\therefore x = \pm\sqrt{2k - k^2 + 1}$

4) $\angle CBD = 60°$ ($\angle$ of equil. $\triangle$)

$\therefore \angle DBA = 120°$ ($\angle$ sum of st. line $= 180°$)

$\therefore x = \dfrac{180 - 120}{2}$

$= 30°$ ✓

5) $4x - y = 1$ ——— ①

$3y - 6x = -1$ ——— ②

① × 3 $12x - 3y = 3$ —③

② + ③ $6x = 2$

$x = \dfrac{1}{3}$

Sub. $x = \dfrac{1}{3}$ into ①

$\dfrac{4}{3} - y = 1$ $\Rightarrow$ $y = \dfrac{4}{3} - 1 = \dfrac{1}{3}$

6) shaded area $= 12\pi$ ✓

non-shaded area $= 48 - 12\pi$ ✓

$\therefore$ fraction of area which lies outside the shaded circles is $\dfrac{48 - 12\pi}{48}$

$= \dfrac{12(4 - \pi)}{48}$ ✓

$= \dfrac{4 - \pi}{4}$ ✓