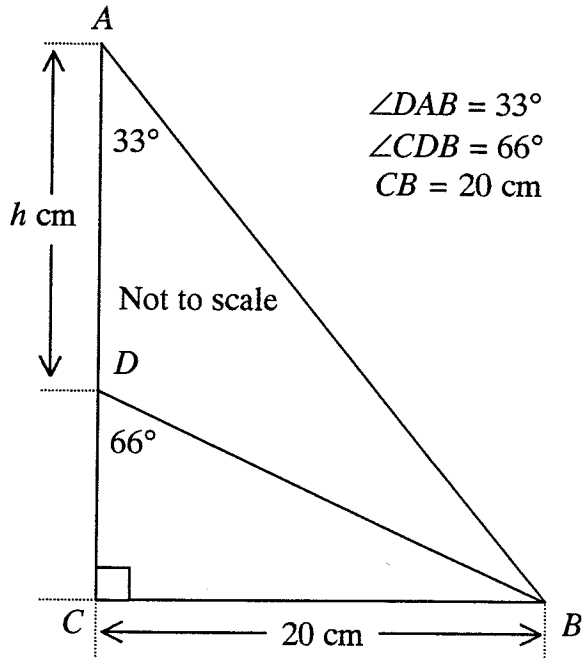
PREPARATORY PRELIMINARY MATHEMATICS
WORKSHEET #3

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

1. In the diagram, find h correct to 3 significant figures.



2. Rationalise the denominator of $\dfrac{1}{3-\sqrt{5}}$.

3. A circle with centre at (4, –1) passes through the point (–2, 1). Find its radius.

4. Solve $2x^2 - x - 5 = 0$ (answer in exact form).

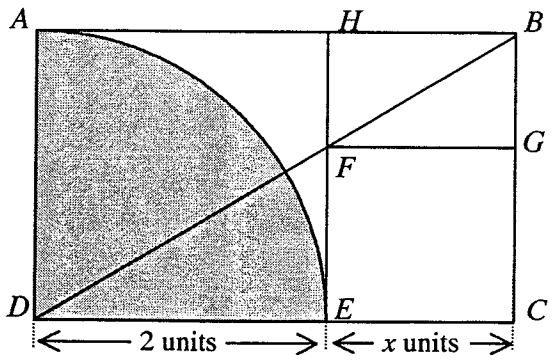
5. Find the position of the vertex of $y = x^2 + 4x + 5$, and hence sketch the curve.

6. Solve for x: $4 - \dfrac{x}{3} > x$.

7. Suppose you wish to solve the equation $x^2 - 8x = 9$ by completing the square in the form $(x-a)^2 = k$. Find the values of a and k.

8. Solve $x^3 - 3x^2 - x + 3 = 0$ by first factorising the *LHS* of the equation.

9. In the diagram, $ABCD$ is a rectangle. Points E and G lie on sides DC and BC respectively. F lies on diagonal DB and $EFGC$ is a square. DA and DE are radii of the shaded quarter circle.



(a) Explain why ΔDEF and ΔDCB must be similar triangles.

(b) Show that $\dfrac{x}{2} = \dfrac{2}{x+2}$.

(c) Show that $EC = \left(\sqrt{5} - 1\right)$ units.

Worksheet # 3

Su-Min Lim

Excellent work!

1. $\angle ABC = 180 - 90 - 33 = 57°$ ($\angle$ sum of $\triangle$)

$\angle CBD = 180 - 90 - 66 = 24°$ (" " " ")

$\tan 57 = \frac{AC}{20}$

$20 \tan 57 = AC$

$\tan 24 = \frac{CD}{20}$

$20 \tan 24 = CD$

$h = 20 \tan 57 - 20 \tan 24 = 21.9$ cm (to 3 sf)

2. $\frac{3+\sqrt{5}}{9-5} = \frac{3+\sqrt{5}}{4}$ ✓

3. $r = \sqrt{(9--2)^2 + (-1-1)^2}$

$= \sqrt{36+4}$ ✓

$= \sqrt{40}$

$= 2\sqrt{10}$ units ✓

4. $\frac{1 \pm \sqrt{1-4\times 2\times -5}}{4}$ ✓

$= \frac{1 \pm \sqrt{41}}{4}$ ✓

9.a) $\angle BDC$ is common

$\angle FED = \angle BCE = 90°$ ($\angle$'s of a ✓ □ or rectangle)

$\angle DFE = \angle DBC$ ($\angle$ sum of $\triangle$'s) ✓

$\triangle DEF \parallel\!\!\parallel \triangle DCB$ (equiangular)

b) $\frac{FE}{DE} = \frac{BC}{DC}$ (corresp. sides on $\parallel\!\!\parallel$ $\triangle$'s)

$FE = x$ (sides of a ✓ □ are =), $DE = 2$ (given), $DC = (x+2)$ (given)

$BC = 2$ (radii of a ○ are =)

$\therefore \frac{x}{2} = \frac{2}{x+2}$ ✓

c) $\frac{x}{2} = \frac{2}{x+2}$

$x^2 + 2x = 4$

$x^2 + 2x - 4 = 0$

$x = \frac{-2 \pm \sqrt{4 - 4 \times 1 \times -4}}{2}$ ✓

$= \frac{-2 \pm \sqrt{20}}{2}$

$= \frac{-1 \pm 2\sqrt{5}}{2}$ ✓

$= -1 \pm \sqrt{5}$

However $-1 - \sqrt{5}$ is negative — a distance must be positive ✓

$\therefore EC = (\sqrt{5} - 1)$ units