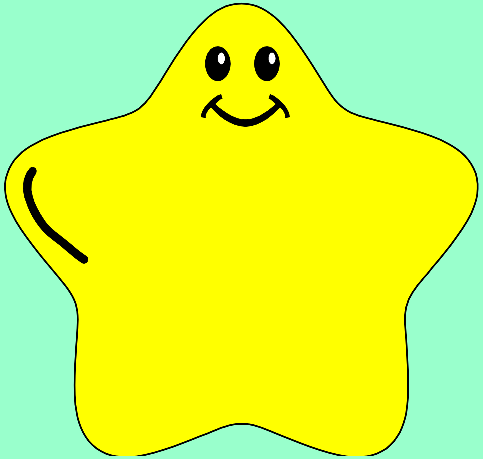
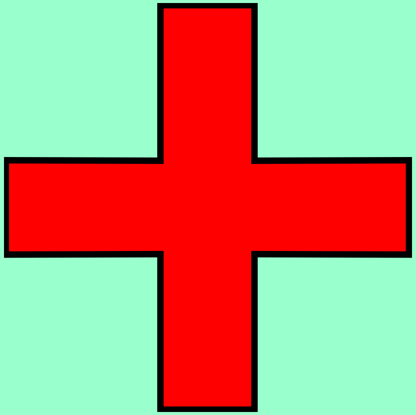
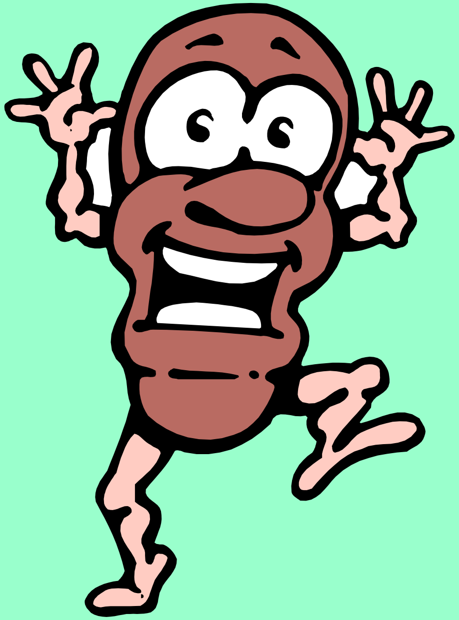
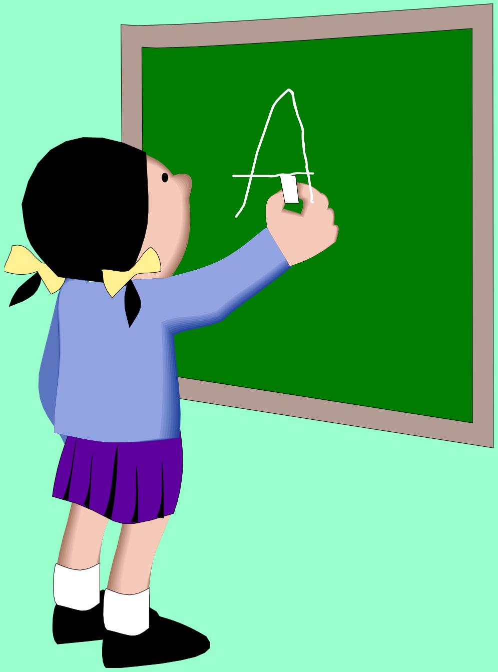




2.

Applications of the Addition Formulae





Example 1

By expressing 15^0 as $(60 – 45)^0$, find the **exact value** of $\sin 15^0$

Solution:

$$\sin 15^0 = \sin(60-45)^0$$ ← Rule 1(b)

$$= \sin 60^0 \cos 45^0 - \cos 60^0 \sin 45^0$$

$$= \frac{\sqrt{3}}{2} \bullet \frac{1}{\sqrt{2}} - \frac{1}{2} \bullet \frac{1}{\sqrt{2}}$$

$$= \frac{\sqrt{3}}{2\sqrt{2}} - \frac{1}{2\sqrt{2}}$$

$$= \frac{\sqrt{3}-1}{2\sqrt{2}}$$ ← $\times \frac{\sqrt{2}}{\sqrt{2}}$

Get rid of surds in denominato r

Example 1

By expressing 15^0 as $(60 – 45)^0$, find the **exact value** of $\sin 15^0$

Solution:

$$\sin 15^0 = \sin(60-45)^0$$ ← Rule 1(b)

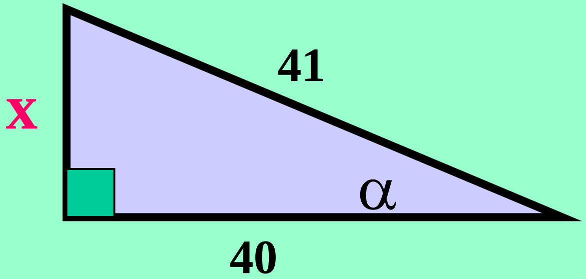
$$= \frac{\sqrt{3}-1}{2\sqrt{2}} \quad \longleftarrow \quad \times\frac{\sqrt{2}}{\sqrt{2}}$$

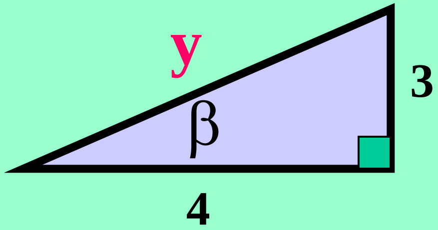
$$= \frac{\sqrt{6}-\sqrt{2}}{2\times 2}$$

$$= \frac{\sqrt{6}-\sqrt{2}}{4} \quad \longrightarrow \quad = \tfrac{1}{4}\left(\sqrt{6}-\sqrt{2}\right)$$

Example 2

NAB





Show that $\cos(\alpha - \beta) = {}^{187}/_{205}$

****

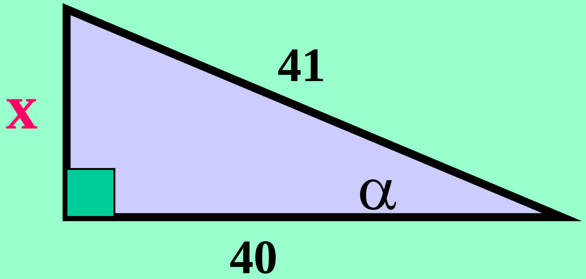
Solution:

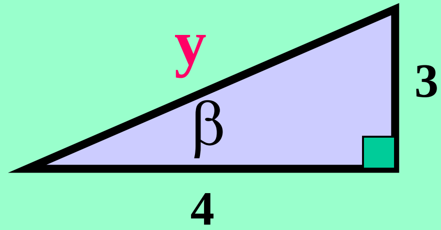
THINK: $$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$

NEED: $$\cos\alpha = \frac{40}{41} \qquad \cos\beta = \frac{4}{y} \qquad \sin\alpha = \frac{x}{41} \qquad \sin\beta = \frac{3}{y}$$

Example 2

NAB





Show that $\cos(\alpha - \beta) = {}^{187}/_{205}$

****

Solution:

BY PYTHAG.

$$x^2 = 41^2 - 40^2 \qquad y^2 = 4^2 + 3^2$$

$$x = \sqrt{81} \qquad y = \sqrt{25}$$

$$x = 9 \qquad y = 5$$

NEED:

$$\cos\alpha = \frac{40}{41} \qquad \cos\beta = \frac{4}{y} \qquad \sin\alpha = \frac{x}{41} \qquad \sin\beta = \frac{3}{y}$$

$$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$

$$= \left(\frac{40}{41} \times \frac{4}{5}\right) + \left(\frac{9}{41} \times \frac{3}{5}\right)$$

$$= \frac{160}{205} + \frac{27}{205}$$

$$= \frac{187}{205}$$

NEED:

$$\cos\alpha = \frac{40}{41} \qquad \cos\beta = \frac{4}{5} \qquad \sin\alpha = \frac{9}{41} \qquad \sin\beta = \frac{3}{5}$$

Heinemann,
p.189, EX 11B, Q3 & 5,
p. 190, EX 11C, Q3 & 6,
p.191, EX 11D, Q4, 5 & 7