Outcome 1 – Integrating inverse trig functions

Worked Example:

Calculate $\int \frac{1}{36 + x^2}\, dx$

1. Use the formula sheet! $\frac{1}{(6)^2+(x)^2}$

$$\int \frac{1}{36 + x^2}\, dx = \frac{1}{6}\tan^{-1}\left(\frac{x}{6}\right) + c$$

Advanced Higher Formula sheet

$f(x)$	$\int f(x)\, dx$
$\frac{1}{\sqrt{a^2 - x^2}}$	$\sin^{-1}\left(\frac{x}{a}\right) + c$
$\frac{1}{a^2 + x^2}$	$\frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + c$

Questions...

Calculate each of the following integrals.

1. $\int \frac{1}{16 + x^2}\, dx$
2. $\int \frac{1}{121 + x^2}\, dx$
3. $\int \frac{1}{\sqrt{9 - x^2}}\, dx$
4. $\int \frac{1}{\sqrt{100 - x^2}}\, dx$
5. $\int \frac{1}{\sqrt{0 \cdot 9 - x^2}}\, dx$
6. $\int \frac{1}{0 \cdot 25 + x^2}\, dx$

Answers

1. $\frac{1}{4}\tan^{-1}\left(\frac{x}{4}\right)+c$
2. $\frac{1}{11}\tan^{-1}\left(\frac{x}{11}\right)+c$
3. $\sin^{-1}\left(\frac{x}{3}\right)+c$
4. $\sin^{-1}\left(\frac{x}{10}\right)+c$
5. $\sin^{-1}\left(\frac{\sqrt{10}x}{3}\right)+c$
6. $2\tan^{-1}(2x)+c$