Name: KEY

Date:

27/29 SSA – Non Calculator Section

(Trigonometry & Circle Geometry)

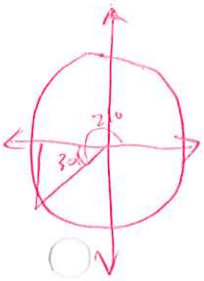
35 Minutes

/32

1. Find the exact value for each trigonometric function below.
(hint: Sketch a unit circle diagram!)

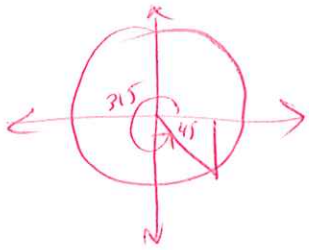
(a) $\cos 210^\circ$ (b) $\sin 315^\circ$ (c) $\tan 450^\circ$

$\therefore \cos 210 = -\frac{\sqrt{3}}{2}$



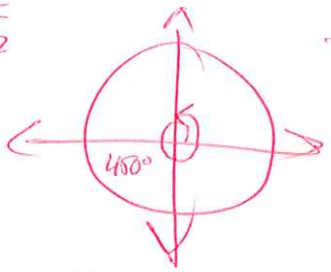
$\therefore \sin 315 = -\frac{\sqrt{2}}{2}$

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



$\sin\theta = 1$
$\cos\theta = 0$

[3]



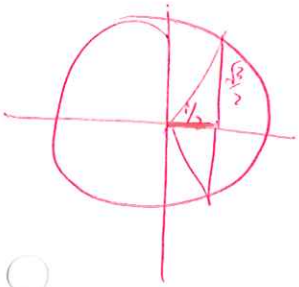
$\therefore \tan 450^\circ = \frac{1}{0}$

= undefined

2. Name all angles θ, $0^\circ \le \theta \le 360^\circ$ that make each statement true.
(hint: Sketch a unit circle diagram!)

[4]

(a) $\cos\theta = \frac{1}{2}$ (b) $\tan\theta = -1$

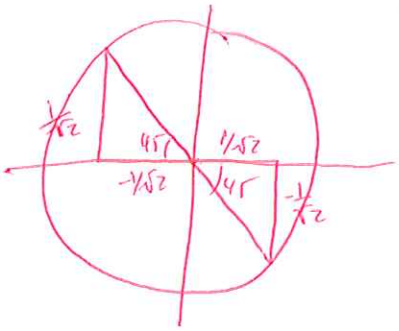


$\therefore \theta = 60^\circ$

or 300°

$= \frac{\sin\theta}{\cos\theta}$

$= \frac{+1/\sqrt{2}}{-1/\sqrt{2}}$ or $\frac{-1/\sqrt{2}}{+1/\sqrt{2}}$



$\therefore \theta = 135^\circ$ or 315°

3. Express the degree measure below in radians. Leave your answer in terms of π. [2]

$$240^\circ \times \frac{\pi \text{ rad}}{180^\circ} = \frac{24\pi}{18} = \frac{4\pi}{3}$$

or .... $\frac{\pi}{3} = 60^\circ \therefore \frac{4\pi}{3} = 240^\circ$

4. Express the radian measure below in degrees. [2]

$$\frac{3\pi}{4} \times \frac{180^\circ}{\pi \text{ rad}} = \frac{3 \times 180}{4}$$

$$= \frac{3 \times 4 \times 45}{4}$$

$$= 135^\circ$$

or ..... $\frac{\pi}{4} = 45^\circ \therefore \frac{3\pi}{4} = 135^\circ$

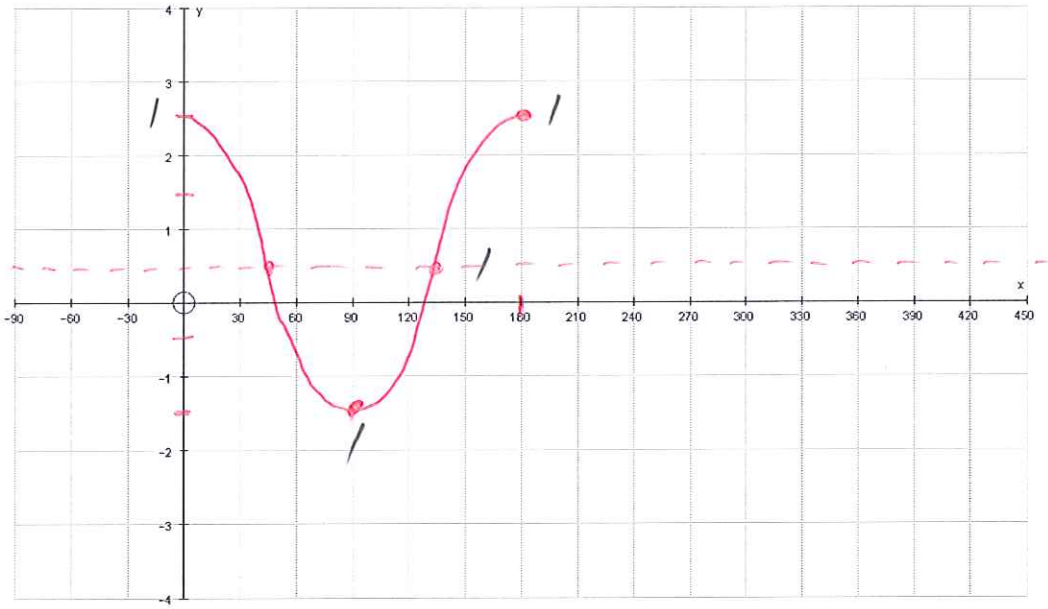
5. Graph each of the following for one complete cycle. **[8]**

(a)

$$y = 2\cos(2x) + \frac{1}{2}$$

$a = 2$

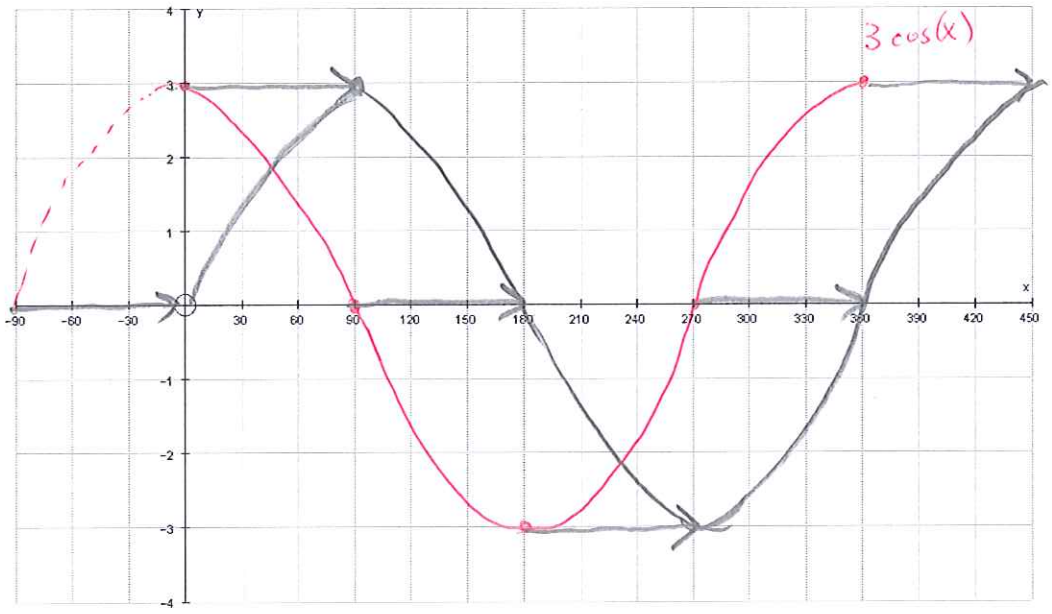
period $= \frac{360}{2} = 180°$



(4)

(b)

y = 3cos (x – 90)



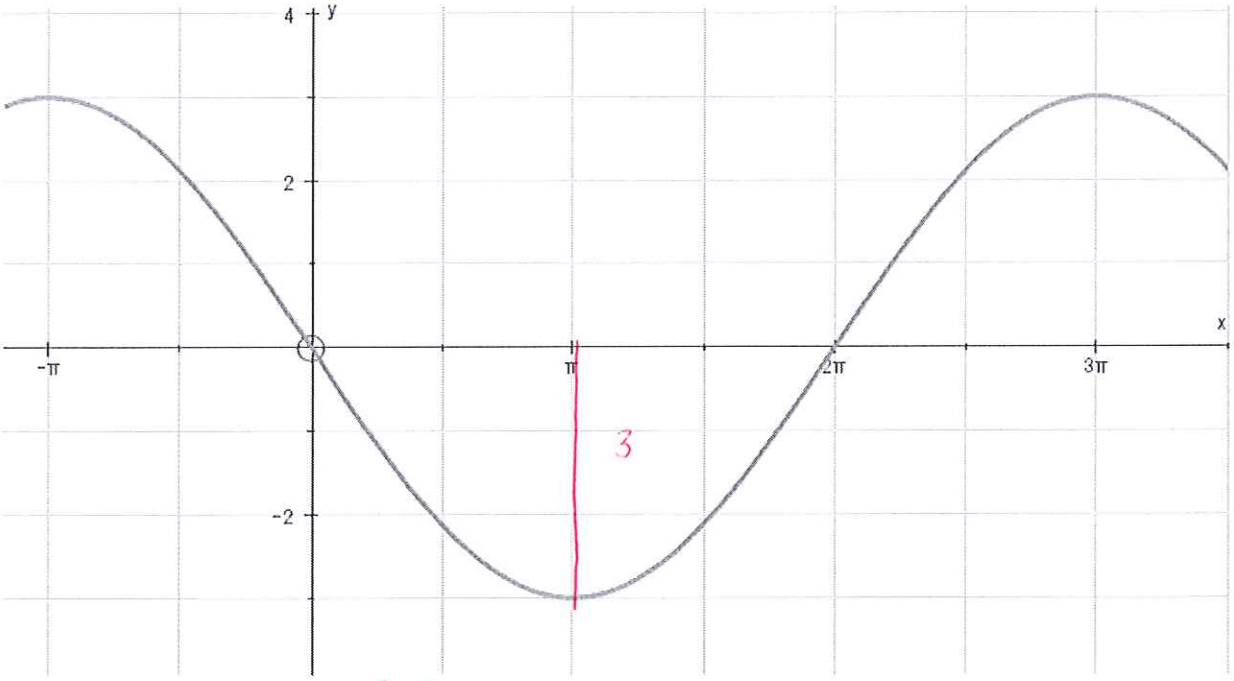
(4)

6. a.) Is the graph below a sine graph or a cosine graph? Explain how you can tell.

sine (starts @ zero) or could be a cosine graph but shifted horizontall. (1)

b.) Determine the equation for the function below:

(3)



4π

∴ expected answer

$y = -3\sin\left(\frac{1}{2}x\right)$

$\therefore p = \frac{2\pi}{b}$

$4\pi = \frac{2\pi}{b}$

$\therefore b = \frac{1}{2}$

But any other suitable answer would be fine.

i.e. $3\cos\left(\frac{1}{2}(x + \cancel{\pi}^{0})\right)$ or

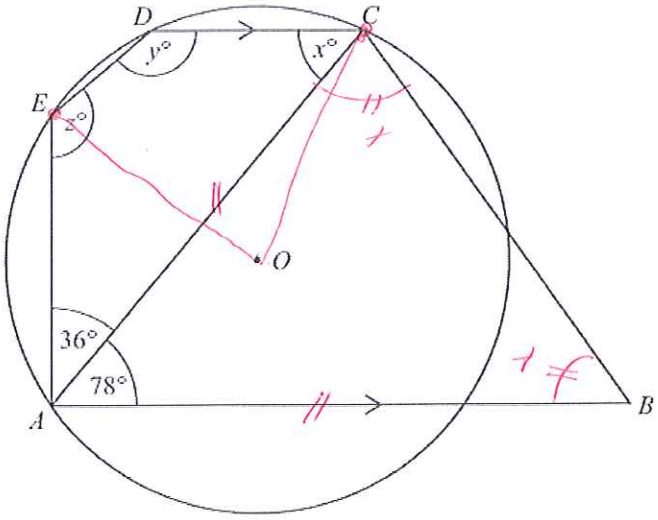
$3\cos\left(\frac{1}{2}(x - 3\pi)\right)$ or

$3\sin\left(\frac{1}{2}(x - 2\pi)\right)$ etc.

although I do not expect anyone to do a combination of horizontal shift & horizontal stretch.

7. Use the given diagram to answer the questions below. **[5]**

NOT TO SCALE



ABCDE is a pentagon.
A circle, centre *O*, passes through the points *A*, *C*, *D* and *E*.
Angle *EAC* = 36°, angle *CAB* = 78° and *AB* is parallel to *DC*.

(a) Find the values of x, y, and z, giving reasons for each.

$\therefore 36 + \cancel{x} = 180$ (cyclic quad)
$y = 144°$

$x + z = 180$ (cyclic quad)
Also $x = 78°$ (alternate interior angles of // lines & intercept)
$\therefore z = 102°$

$\boxed{\begin{array}{l} x = 78° \\ y = 144° \\ z = 102° \end{array}}$

(3)

(b) Find the value of angle EOC.

EOC is in minor arc $\overset{\frown}{EC}$ just like angle EAC.

$\therefore 2E\hat{A}C = E\hat{O}C$
$2(36) = E\hat{O}C$
$72° = E\hat{O}C$

(1)

(c) If AB = AC what is the value of angle ABC?

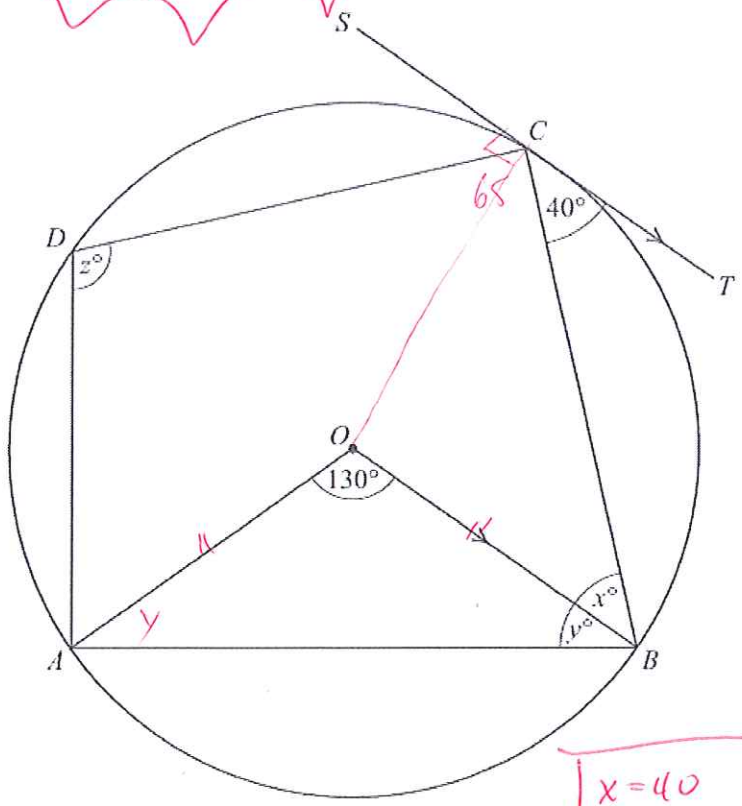
$\therefore$ it is an isoceles $\triangle$:
$\therefore$ base angles are the same
$\therefore 78 + x + x = 180$
$2x = 102$
$x = 51° = m\angle ABC$

(1)

Discrepency! (see back)

8. Use the given diagram to answer the questions below. **[4]**

NOT TO SCALE



$x = 40$
$y = 25$
$z = 115$

A, B, C and D lie on a circle, centre O.
SCT is the tangent at C and is parallel to OB.
Angle $AOB = 130°$, and angle $BCT = 40°$.
Angle $OBC = x°$, angle $OBA = y°$ and angle $ADC = z°$.

(a) Find the values of x, y, and z.

$\therefore x = 40°$ (alt interior angles)
$y + y + 130 = 180$ (isosceles Δ)
$2y = 50$
$y = 25°$

and $(x+y) + z = 180$
(cyclic quad)
$65° + z = 180$
$z = 180 - 65°$
$z = 115°$

(b) What is the value of angle OCT?

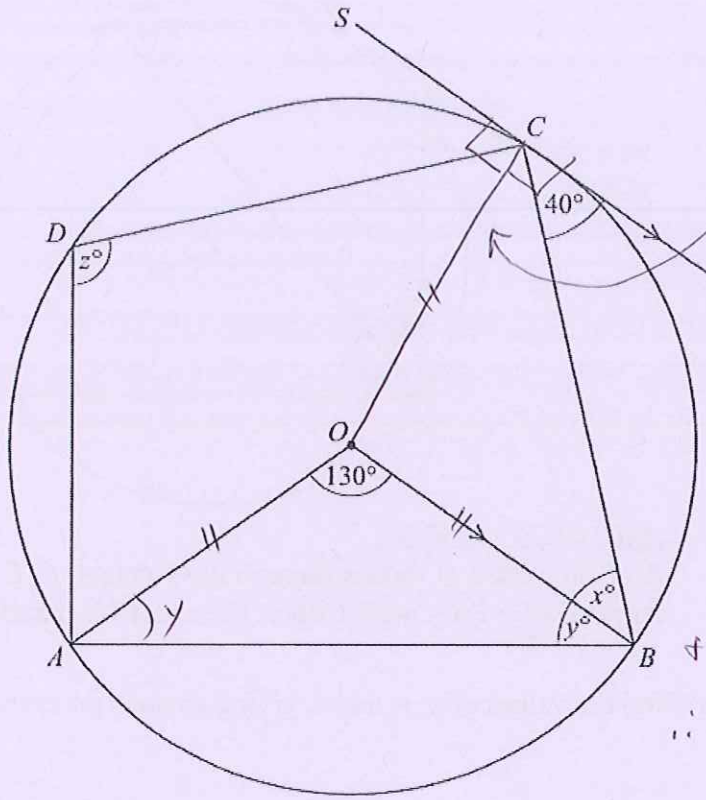
$90°$ (radius tangent!)

See back

There is a discrepancy in this problem (i.e. it is flawed and there are two possible solutions!

8. Use the given diagram to answer the questions below. **[4]**

NOT TO SCALE



This must be 50° (radius tangent)

OC is a radius & OB is a radius

∴ the triangle BOC is isosceles

& ∠OCB = ∠CBO = 50°

∴ x = 50°

A, *B*, *C* and *D* lie on a circle, centre *O*.
SCT is the tangent at *C* and is parallel to *OB*.
Angle *AOB* = 130°, and angle *BCT* = 40°.
Angle *OBC* = *x*°, angle *OBA* = *y*° and angle *ADC* = *z*°.

(a) Find the values of x, y, and z.

x = 50°

y + y + 130 = 180 (angles of isosceles Δ OAB)

∴ y = 25°

(still 25°)

(b) What is the value of angle OCT?

OCT is 90° (still radius tangent)