

Higher Ink Exercise  
Block 2 - Trigonometric Graphs

Calculators should only be used when necessary

1a) Convert to radians:

- i.  $120^\circ$       ii.  $100^\circ$       iii.  $35^\circ$       iv.  $350^\circ$       v.  $780^\circ$

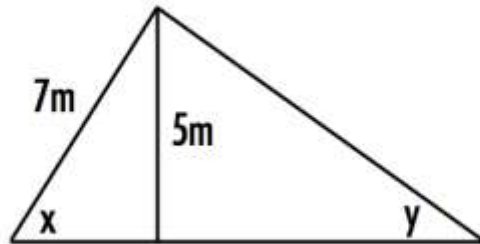
b) Convert to degrees:

- i.  $3\pi$  rad      ii.  $\frac{5\pi}{6}$  rad      iii.  $\frac{6\pi}{11}$  rad      iv.  $\frac{8\pi}{9}$  rad      v.  $\frac{25\pi}{27}$  rad

[10]

2a) For the triangle below, calculate the values of:

- i.  $\sin x + \cos x$       ii.  $2 \sin x$       iii.  $\sin 2x$

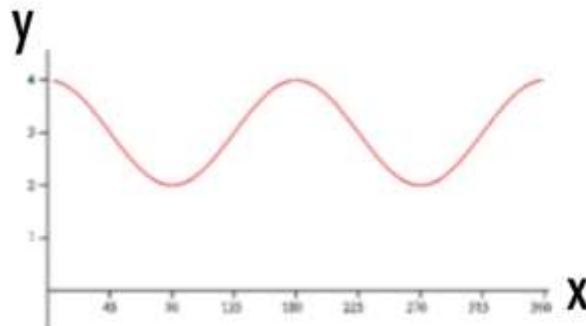


b) If  $\sin y = \frac{1}{2}$ , find:

- ii. all missing angles      ii. the area of the triangle

[8]

3) Write down the equation of this graph.



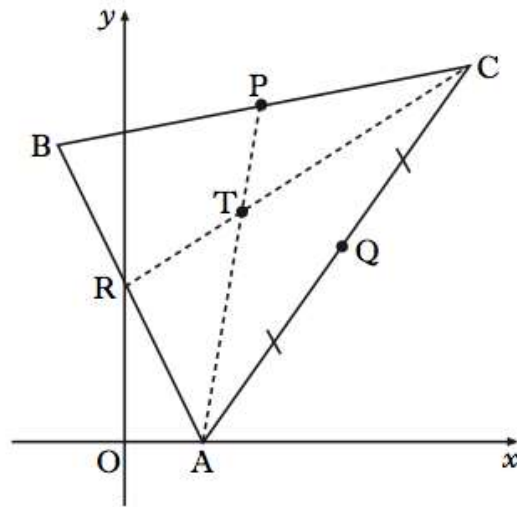
[3]

4) Sketch the graph of  $y = 3\sin(x - \frac{2\pi}{3})$  for  $0 \leq x \leq 4\pi$

Clearly show the maximum and minimum values and where it cuts both axes.

[3]

5) Triangle ABC has vertices A(4, 0), B(-4, 16) and C(18, 20).



Medians AP and CR intersect at T(6, 12).

- Find the equation of the median BQ.
- Verify that T lies on BQ.
- Find the ratio in which T divides BQ.

[6]

6) Functions  $f$ ,  $g$  and  $h$  are defined on the set of real numbers by:

$$f(x) = x^3 - 1$$

$$g(x) = 3x + 1$$

$$h(x) = 4x - 5$$

- Find  $g(f(x))$ .
- Show that  $g(f(x)) + xh(x) = 3x^3 + 4x^2 - 5x - 2$ .
- Show that  $(x - 1)$  is a factor of  $3x^3 + 4x^2 - 5x - 2$ .
  - Factorise  $3x^3 + 4x^2 - 5x - 2$  fully.

[8]

Total [38]

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Marking Scheme

Question 1

a)

- i.  $2\pi/3$
- ii.  $5\pi/3$
- iii.  $7\pi/36$
- iv.  $35\pi/18$
- v.  $13\pi/3$

b)

- i.  $540^\circ$
- ii.  $150^\circ$
- iii.  $98.18^\circ$
- iv.  $160^\circ$
- v.  $166.67^\circ$

Question 2

Question 3

- $y = \cos\dots$
- $2x\dots$
- $+ 3$

Question 4

Question 5

a)

- $Q = (11,10)$
- $m_{BQ} = 6/-15$
- $y - 10 = 6/-15(x - 11)$
- $-15y + 150 = 6(x - 11)$
- $6x + 15y - 216 = 0$

b)

- $6(6) + 15(12) - 216 = 0$  if T lies on BQ  
 $36 + 180 - 216 = 0 \therefore$  T lies on BQ

c)

Question 6

a)

- $g(f(x)) = 3(x^3 - 1) + 1$   
 $= 3x^3 - 3 + 1$   
 $= 3x^3 - 2$

b)

- $xh(x) = x(4x - 5) = 4x^2 - 5x$
- $g(f(x)) + xh(x) = 3x^3 - 2 + 4x^2 - 5x$   
 $= 3x^3 + 4x^2 - 5x - 2$

c)

