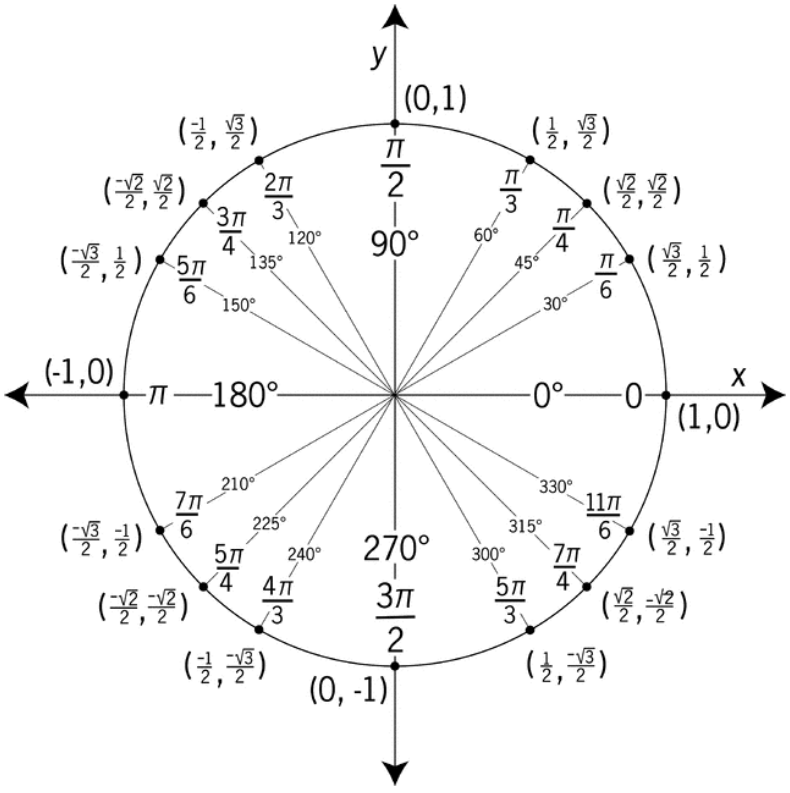
Final Exam Review: Trig and Transformations

Use this sheet in conjunction with your old notes, quizzes, and tests to review.

Formulas/Identities:

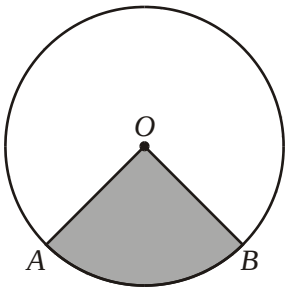
Unit Circle:



1. Solve the equation $3\sin^2 x = \cos^2 x$, for $0° \le x \le 180°$.

(Total 4 marks)

2. *O* is the centre of the circle which has a radius of 5.4 cm.



The area of the shaded sector *OAB* is 21.6 cm^2. Find the length of the minor arc *AB*.

(Total 4 marks)

3. A triangle has sides of length 4, 5, 7 units. Find, to the nearest tenth of a degree, the size of the largest angle.

(Total 4 marks)

4. $f(x) = 4\sin\left(3x + \frac{\pi}{2}\right)$.

For what values of *k* will the equation $f(x) = k$ have no solutions?

(Total 4 marks)

5. If A is an obtuse angle in a triangle and $\sin A = \frac{5}{13}$, calculate the exact value of $\sin 2A$.

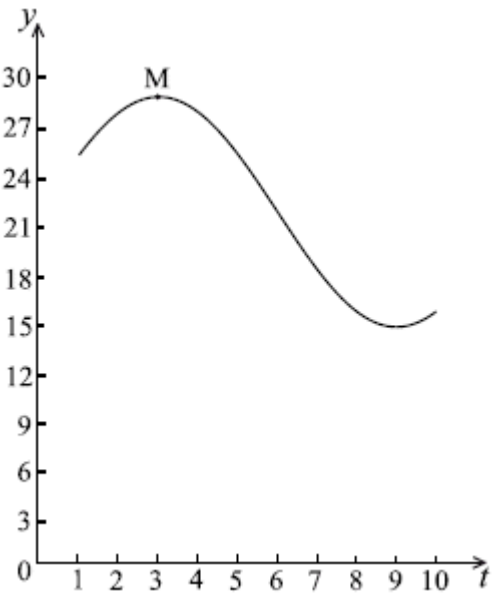
(Total 4 marks)

6. In a triangle ABC, AB = 4 cm, AC = 3 cm and the area of the triangle is 4.5 cm^2.

Find the **two** possible values of the angle $B\hat{A}C$.

(Total 6 marks)

7. Let $f(t) = a \cos b\,(t - c) + d$, $t \geq 0$. Part of the graph of $y = f(t)$ is given below.



When $t = 3$, there is a maximum value of 29, at M.
When $t = 9$, there is a minimum value of 15.

(a) (i) Find the value of a.

(ii) Show that $b = \frac{\pi}{6}$.

(iii) Find the value of d.

(iv) Write down a value for c.

(7)

The transformation P is given by a horizontal stretch of a scale factor of $\frac{1}{2}$, followed by a translation of $\begin{pmatrix} 3 \\ -10 \end{pmatrix}$.

(b) Let M′ be the image of M under P. Find the coordinates of M′.

(2)

The graph of g is the image of the graph of f under P.

(c) Find $g(t)$ in the form $g(t) = 7 \cos B(t - C) + D$.

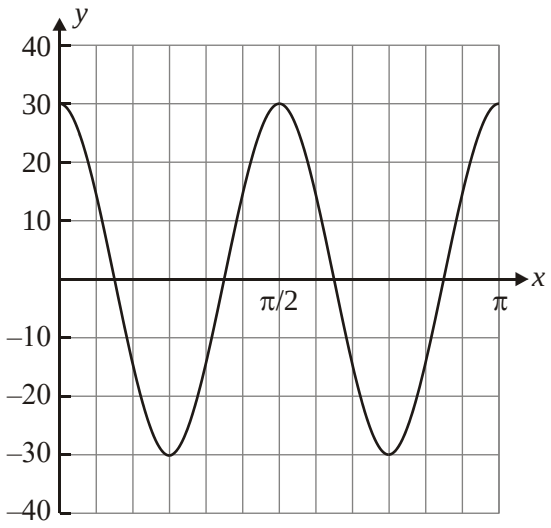
(4)

(d) Give a full geometric description of the transformation that maps the graph of g to the graph of f.

(3)

(Total 16 marks)

8. The graph of a function of the form $y = p \cos qx$ is given in the diagram below.



(a) Write down the value of p.

(b) Calculate the value of q.

(Total 6 marks)

9. In triangle ABC, AC = 5, BC = 7, $\hat{A} = 48°$, as shown in the diagram.

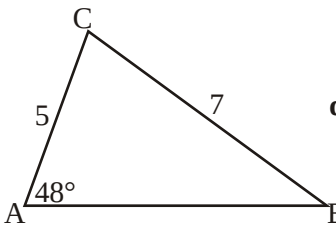
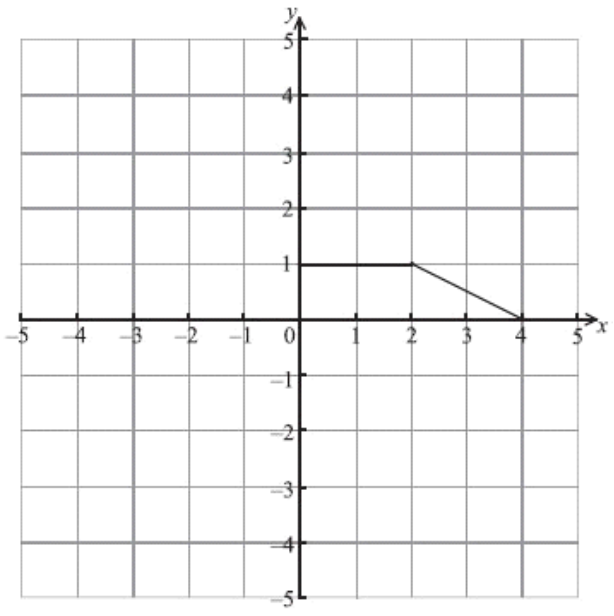


diagram not to scale

Find $\hat{B}$, giving your answer correct to the nearest degree.

(Total 6 marks)

10. The graph of the function $y = f(x)$, $0 \le x \le 4$, is shown below.

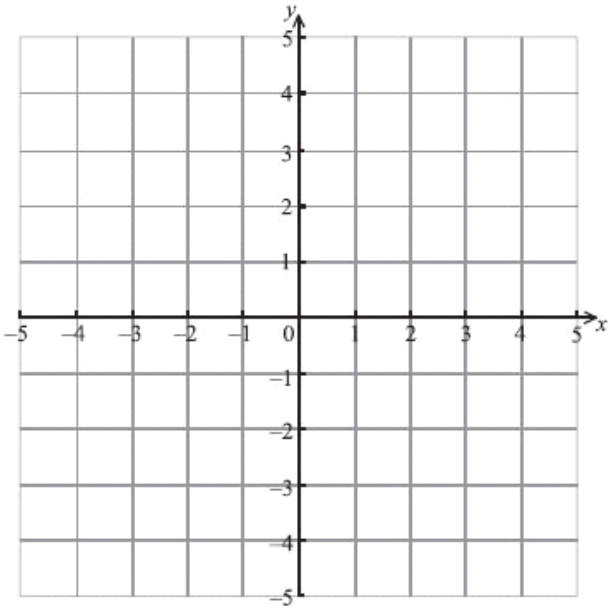


(a) Write down the value of

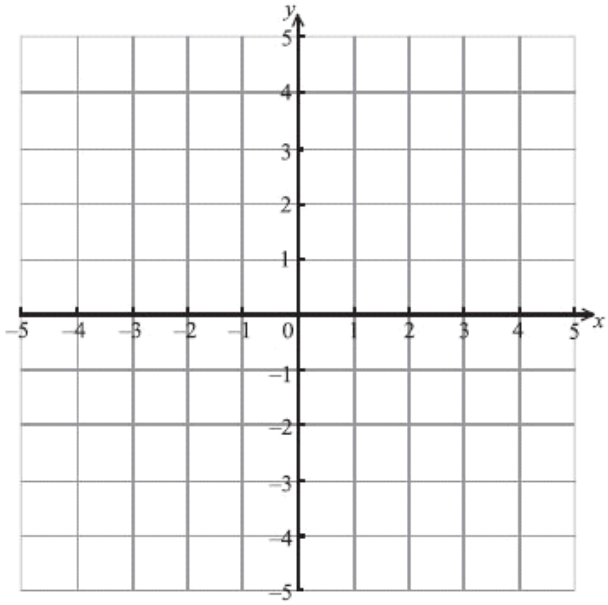
(i) $f'(1)$;

(ii) $f'(3)$.

(b) On the diagram below, draw the graph of $y = 3f(-x)$.

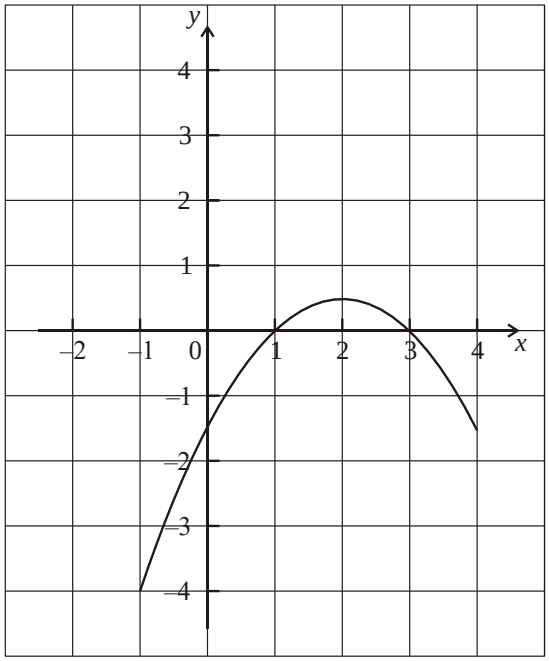


(c) On the diagram below, draw the graph of $y = f(2x)$.



(Total 6 marks)

10. Part of the graph of a function f is shown in the diagram below.



(a) On the same diagram sketch the graph of $y = -f(x)$.

(2)

(b) Let $g(x) = f(x + 3)$.

(i) Find $g(-3)$.

(ii) Describe **fully** the transformation that maps the graph of f to the graph of g.

(4)

(Total 6 marks)

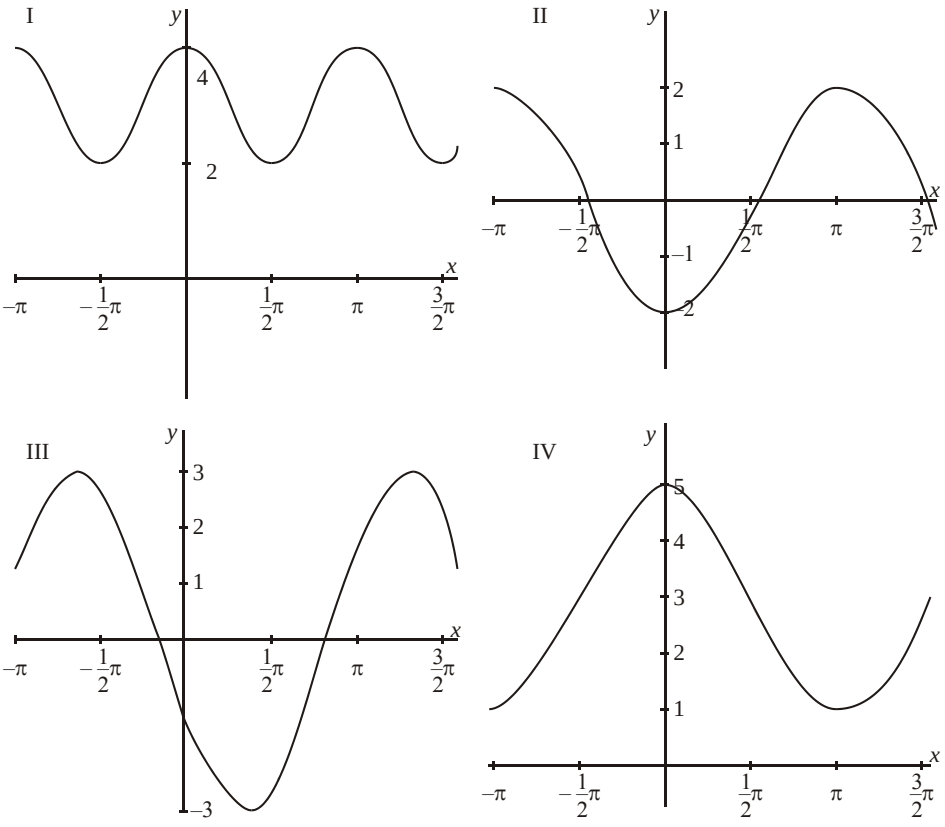
12. Three of the following diagrams I, II, III, IV represent the graphs of

(a) $y = 3 + \cos 2x$

(b) $y = 3\cos(x + 2)$

(c) $y = 2\cos x + 3$.

Identify which diagram represents which graph.



(Total 4 marks)