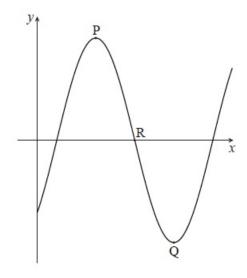
7.4 Do Now Quiz: Periodic-functions, trigonometry spiral review (with calculator)

Solve either the *Mild/Medium* problems (1, 3, 4, 5; 24 points) or the *Spicy* (2, 6; 30 points)

1a. Medium: Let $f(x) = a\cos(b(x-c))$. The diagram below shows part of the graph of f, for $0 \leq x \leq 10$.



The graph has a local maximum at P(3,5), a local minimum at Q(7,-5), and crosses the x-axis at R. Write down the value of

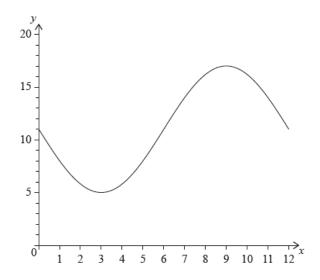
(i) *a*;

(ii) c. [2 marks]

1b. Find the value of *b*. [2 marks]

1c. Find the *x*-coordinate of R. [2 marks]

2a. *Spicy:* The following diagram shows the graph of $f(x)=a\sin bx+c$, for $0\leqslant x\leqslant 12$.



The graph of f has a minimum point at (3, 5) and a maximum point at (9, 17).

[6 marks]

- (i) Find the value of c.
- (ii) Show that $b = \frac{\pi}{6}$.
- (iii) Find the value of a.

2b. The graph of g is obtained from the graph of f by a translation of $\binom{k}{0}$. The maximum point on the graph of g has coordinates (11.5, 17).

- (i) Write down the value of k.
- (ii) Find g(x).

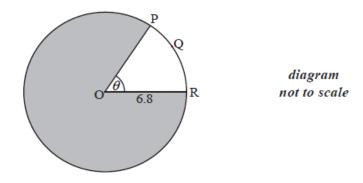
[3 marks]

2c. The graph of ${\it g}$ changes from concave-up to concave-down when x=w.

- (i) Find w.
- (ii) Hence or otherwise, find the maximum positive rate of change of \mathcal{G} .

[6 marks]

3a. *Mild:* Consider the following circle with centre O and radius 6.8 cm.



The length of the arc PQR is 8.5 cm.

Find the value of heta . [2 marks]

3b. Find the area of the shaded region. [4 marks]

4a. *Mild:* Write down the value of

(i)
$$\log_3 27$$
; [1 mark]

(ii)
$$\log_8 \frac{1}{8}$$
; [1 mark]

(iii) $\log_{16}4$. [1 mark]

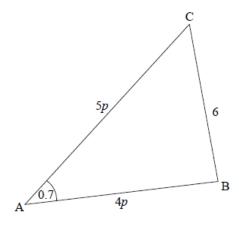
4b. Hence, solve
$$\log_3 27 + \log_8 rac{1}{8} - \log_{16} 4 = \log_4 x$$
 [3 marks]

5a. *Medium:* Let $f(x) = k \log_2 x$.

Given that
$$f^{-1}(1) = 8$$
 , find the value of k . [3 marks]

$$f^{-1}\left(rac{2}{3}
ight)$$
. [4 marks]

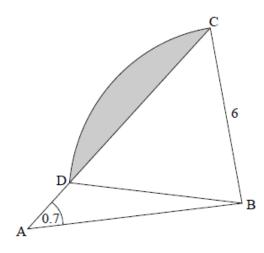
6a. *Spicy:* The following diagram shows a triangle ABC.



 $\mathrm{BC}=6$, $\mathrm{C\widehat{A}B}=0.7$ radians, $\mathrm{AB}=4p$, $\mathrm{AC}=5p$, where p>0 .

- (i) Show that $p^2(41-40\cos0.7)=36$.
- (ii) Find *p*. [4 marks]

6b. Consider the circle with centre B that passes through the point C. The circle cuts the line CA at D, and \widehat{ADB} is obtuse. Part of the circle is shown in the following diagram.



Write down the length of BD.

[1 mark]

6c. Find \widehat{ADB} .

- **6d.** (i) Show that $\widehat{CBD} = 1.29$ radians, correct to 2 decimal places.
 - (ii) Hence, find the area of the shaded region.

[6 marks]