Topic 1
Graphs

THEMES

1 **Graphs, equations of basic functions**
2 **Odd, even functions**
3 **Behaviour of a curve as $x \to \pm\infty$, 0, $\pm a$**
4 **Curve sketching using calculus (including implicit differentiation)**
5 **Curves with horizontal, vertical, oblique asymptotes**
6 **Operations on curves (reciprocal, absolute value, multiplication, division, powers)**

FORMULA TEST

1 The intercepts with the axes are found by setting $x =$ ☐, $y =$ ☐

2 A function is odd if $f(-x) =$ ☐ and is symmetric about the .....

3 A function is even if $f(x) =$ ☐ and is symmetric about the ☐ axis

4 When $f(x)$ is undefined, the asymptotes are .....

5 If $y = \lim_{x \to \pm\infty} f(x)$ exists, the asymptotes are .....

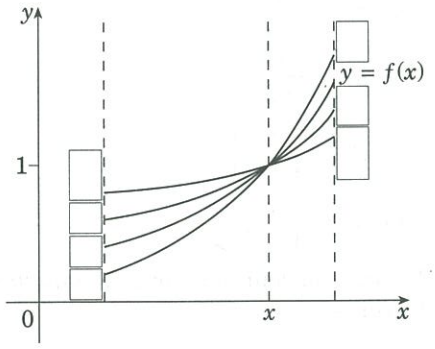
6 **(a)** $f(x)$ is increasing if $f'(x) >$ ☐

(b) $f(x)$ is decreasing if $f'(x) <$ ☐

7 **(a)** $f(x)$ is concave up if $f''(x) >$ ☐

(b) $f(x)$ is concave down if $f''(x) <$ ☐

8 The graphs of $y = f(x)$, $[f(x)]^2$, $\sqrt{f(x)}$, $\frac{1}{f(x)}$ appear below. Match each graph with the appropriate function.



Answers to formula test.

1 $x = 0$, $y = 0$

2 $f(-x) = -f(x)$; origin

3 $f(x) = f(-x)$; y axis

4 vertical

5 horizontal

6 **(a)** $f'(x) > 0$ **(b)** $f'(x) < 0$

7 **(a)** $f''(x) > 0$ **(b)** $f''(x) < 0$

8