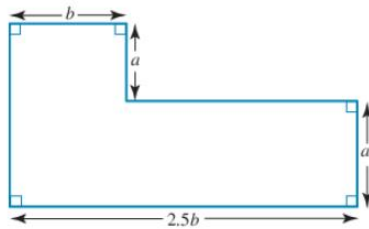


Methods Lesson 8

Tech Active

10. A playground is being constructed by the local council. The shape of the playground is shown. All measurements are in metres. The perimeter of the playground is known to be **96** metres.



- Determine the values of a and b that give a maximum area for the playground.
- Determine the maximum area.

Tech Free

16. Water is being poured into a vase. The volume, V mL, of water in the vase after t seconds is given by $V = \frac{2}{3}t^2(15 - t)$, $0 \leq t \leq 10$.
- What is the volume after **10** seconds?
 - At what rate is the water flowing into the vase at t seconds?
 - What is the rate of flow after **3** seconds?
 - When is the rate of flow the greatest, and what is the rate of flow at this time?

QUESTION 17 (6 marks)

A chemical is added to the water in a swimming pool at 10:00 am to prevent algae. The amount of chemical absorbed into the water over time t (hours) is represented by

$$A = 10t^2 - 4t^3, \quad 0 \leq t \leq 1\frac{2}{3}$$

Determine the time of day when the rate of absorption of the chemical is at its maximum. Use calculus techniques to verify that your time corresponds to a maximum rate.

14. Sketch the graphs of each of the following by determining the coordinates of all axis intercepts and any stationary points, and establishing their nature. Also determine the coordinates of the point(s) of inflection.
- $y = x^3 - x^2 - 16x + 16$

Find: y-int, x-int, stationary points (x-value only), nature of stationary points, point of inflection and where is it concave up and where is it concave down

Tech active

15. A manufacturing company is required to produce cylindrical cans (for tuna) of volume 50 cm^3 . The tin used to produce the cans costs 40 cents per 100 cm^2 .

- Determine the area of tin required, A , in terms of the radius, r .
- Calculate the radius of the can (to the nearest tenth) for minimum area.
- Hence, calculate the minimum area (to the nearest tenth).
- What is the cost of tin to produce 10 000 such cans? Give your answer to the nearest \$20.



Tech active

14. A rower is in a boat 4 km from the nearest point, O, on a straight beach. His destination is 8 km along the beach from O. If he is able to row at 5 km/h and walk at 8 km/h, what point on the beach should he row to in order to reach his destination in the least possible time? Give your answer correct to 1 decimal place.

