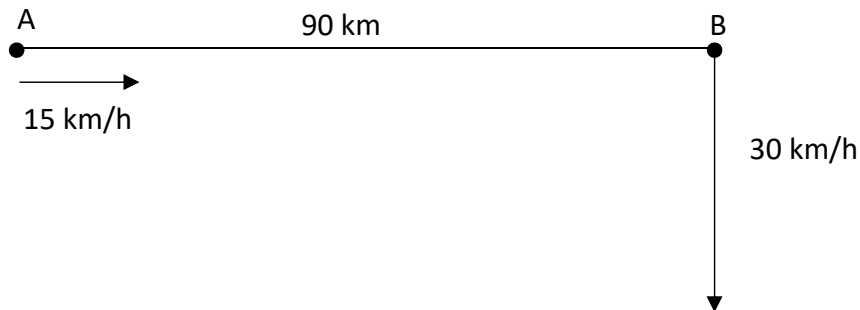**Question 9** (25 marks)

Two ships set sail at the same time, Ship A from Port A and Ship B from Port B.
Port A is 90 km due west of Port B, as shown below.
Ship A is traveling due east at a speed of 15 km/h.
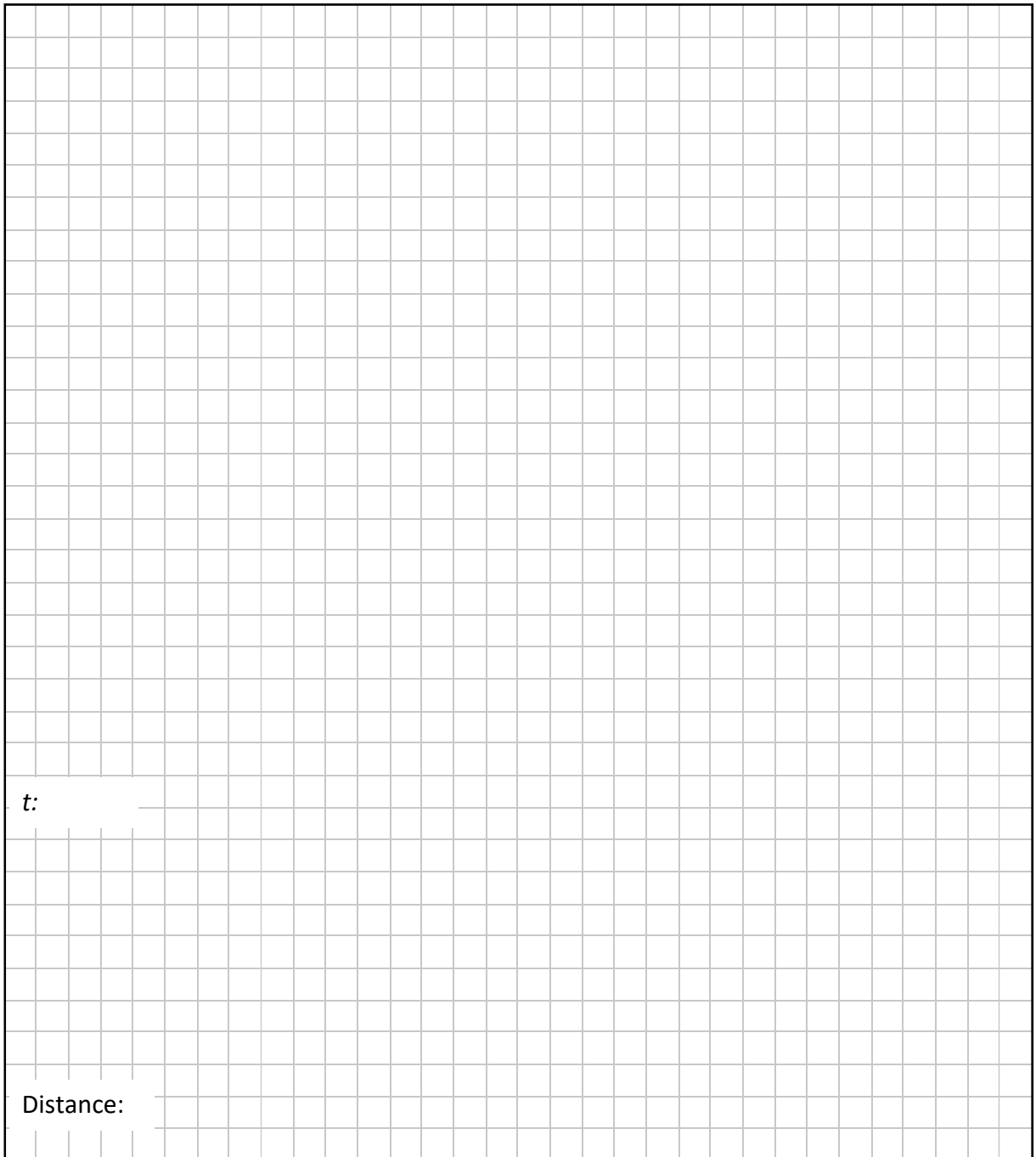Ship B is travelling due south at a speed of 30 km/h.

A ————————— 90 km ————————— B

15 km/h

30 km/h

(a) Find the distance between the two ships 30 minutes after they set sail.
Give your answer in km, correct to 2 decimal places.

(b) t is the time in hours after the ships set sail.
Show that the distance between the ships at time t can be given by the function
$$s(t) = (1125t^2 - 2700t + 8100)^{\frac{1}{2}},$$
where $0 \leq t \leq 6$.

(c) Use calculus to find the value of t when the ships are closest to each other, **and** find the distance between the ships at your value of t.
Give the distance in km, correct to 1 decimal place.

t:

Distance: