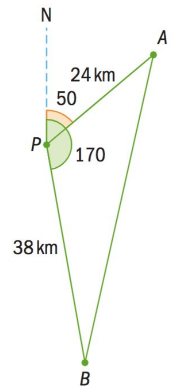
1. **(T1.9, R, CA)** Find the a^2b^4 term in the expansion of $(2a-3b)^6$. *(Oxford 6.9, p.188)*

2. **(T4.6, R, CA)** Given that $P(E') = P(F) = 0.6$, and $P(E \cap F) = 0.24$
(Oxford, 3.2, p.68)

   a. Write down $P(E)$.
   b. Explain why E and F are independent.
   c. Explain why E and F are not mutually exclusive
   d. Find $P(E \cup F')$.

3. **(T3.2, R, CA)** Two ships sail from the same port P at the same time. Ship A sails on a bearing of 050° for a distance of 24km before dropping anchor. Ship B sails on a bearing of 170° for a distance of 38 km before dropping anchor. Find the distance between the two ships when they are stationary.
(Cirrito 9.2, p.278)



4. **(T3.8, R, CI)** The owner of an ice cream shop tracks his annual sales and discovers that he sells a minimum of 5 gallons of ice cream on the first day of January, and a maximum of 37 gallons on the first day of July.
(Cirrito 10.4, p.351)

   a. Assuming the annual sales can be modeled by a cosine function, create an equation to model this situation. Let x represent the month.
   b. How many gallons would he expect to sell on the first day of April?
   c. During what month would he expect to sell 30 gallons of ice cream in one day?

5. **(T 4.4, R, CA)** Each day a clothing factory recorded the number of coats, x, it produces and the total production cost, y, in dollars. The results for nine days are shown in the following table.
(Oxford, 10.1, p. 332)

x	26	44	65	43	50	31	68	46	57
y	400	582	784	625	699	448	870	537	724

   a. Write down the equation of the regression line of y on x.

Use your regression line as a model to answer the following questions

   b. Interpret the meaning of the gradient and the y-intercept
   c. Estimate the cost of producing 70 coats
   d. The factory sells the boxes for $19.99 each. Find the smallest number of coats that the factory should produce in one day in order to make a profit.

6. **(T1.3, R, CA)** A geometric series has nine terms, a common ratio of 2, and sum of 3577. Find the first term. *(Cirrito 8.2, p.252)*

7. **(T2.10, R, CA)** An equation of the form $N(t) = \frac{a}{1+be^{-ct}},\ t \geq 0,$ where $a, b,$ and c are positive constants represents a logistic curve. Logistic curves have been found useful when describing a population N that initially grows rapidly, but whose growth rate decreases after t reaches a certain value. A study of the growth of protozoa was found to display these characteristics. It was found that the population was well described if $c = 1.12,\ a = 100,$ and t measured time in days. (Cirrito 7.2, p209)
   a. If the initial population was 5 protozoa, find the value of b.
   b. It was found that the growth rate was a maximum when the population size reached 50. How long did it take for this to occur?
   c. Determine the optimum population size for the protozoa.

8. **(T. 25, 2.9, R, CI)** Solve the following:
   (Cirrito 7.4, p219)
   a. Each of the following equations for x, giving exact values in terms of the natural logarithm 'ln' or in terms of 'e'
      i. $3^x = 6$
      ii. $log_e(3x+1) - log_e(4-x) = log_e 4$
   b. If $f(x) = x + \frac{1}{x+1},\ x > 0,$ find $f^{-1}(3)$.
   c. If $f(x) = \sqrt{x-1}$ and $g(x) = \frac{1}{x^2},$ write down expressions for $f(g(x))$ and $g(f(x))$.
      i. For what values of x is $f(g(x))$ defined?