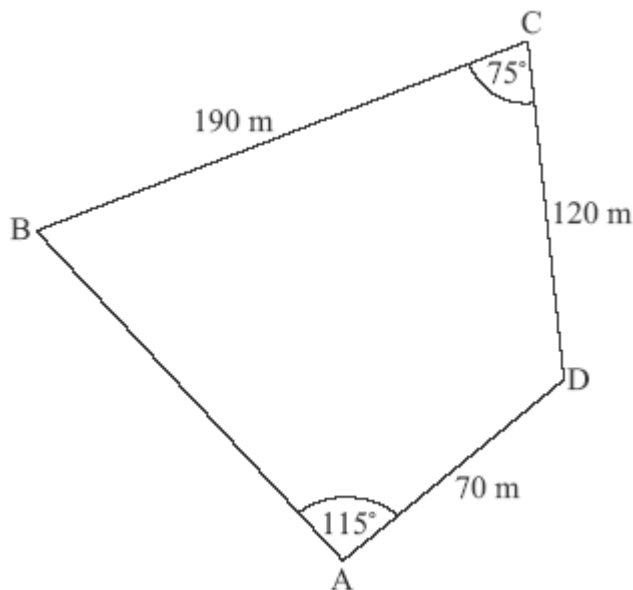


1. Pauline owns a piece of land ABCD in the shape of a quadrilateral. The length of BC is 190 m, the length of CD is 120 m, the length of AD is 70 m, the size of angle BCD is  $75^\circ$  and the size of angle BAD is  $115^\circ$ .



*diagram not to scale*

Pauline decides to sell the triangular portion of land ABD. She first builds a straight fence from B to D.

- (a) Calculate the length of the fence.

(3)

The fence costs 17 USD per metre to build.

- (b) Calculate the cost of building the fence. Give your answer correct to the nearest USD.

(2)

- (c) Show that the size of angle ABD is  $18.8^\circ$ , correct to three significant figures.

(3)

(d) Calculate the area of triangle ABD.

(4)

She sells the land for 120 USD per square metre.

(e) Calculate the value of the land that Pauline sells. Give your answer correct to the nearest USD.

(2)

Pauline invests 300 000 USD from the sale of the land in a bank that pays compound interest compounded annually.

(f) Find the interest rate that the bank pays so that the investment will double in value in 15 years.

(4)

**(Total 18 marks)**

2. Give all answers in this question to the nearest whole currency unit.

Ying and Ruby each have 5000 USD to invest.

Ying invests his 5000 USD in a bank account that pays a nominal annual interest rate of 4.2 % **compounded yearly**. Ruby invests her 5000 USD in an account that offers a fixed interest of 230 USD each year.

(a) Find the amount of money that Ruby will have in the bank after 3 years. (2)

(b) Show that Ying will have 7545 USD in the bank at the end of 10 years. (3)

(c) Find the number of complete years it will take for Ying's investment to first exceed 6500 USD. (3)

(d) Find the number of complete years it will take for Ying's investment to exceed Ruby's investment. (3)

Ruby moves from the USA to Italy. She transfers 6610 USD into an Italian bank which has an exchange rate of 1 USD = 0.735 euros. The bank charges 1.8 % commission.

(e) Calculate the amount of money Ruby will invest in the Italian bank after commission. (4)

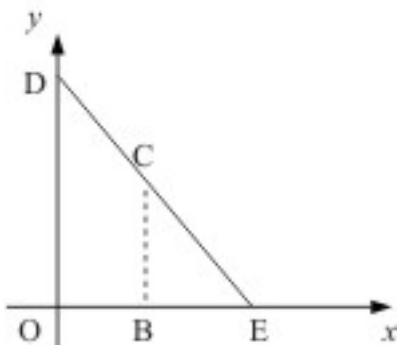
Ruby returns to the USA for a short holiday. She converts 800 euros at a bank in Chicago and receives 1006.20 USD. The bank advertises an exchange rate of 1 euro = 1.29 USD.

(f) Calculate the percentage commission Ruby is charged by the bank. (5)

(Total 20 marks)

3. On the coordinate axes below, D is a point on the y-axis and E is a point on the x-axis.

O is the origin. The equation of the line DE is  $y + \frac{1}{2}x = 4$ .



*diagram not to scale*

- (a) Write down the coordinates of point E.

(2)

C is a point on the line DE. B is a point on the x-axis such that BC is parallel to the y-axis. The x-coordinate of C is  $t$ .

- (b) Show that the y-coordinate of C is  $4 - \frac{1}{2}t$ .

(2)

OBCD is a trapezium. The y-coordinate of point D is 4.

- (c) Show that the area of OBCD is  $4t - \frac{1}{4}t^2$ .

(3)

- (d) The area of OBCD is 9.75 square units. Write down a quadratic equation that expresses this information.

(1)

- (e) (i) Using your graphic display calculator, or otherwise, find the two solutions to the quadratic equation written in part (d).

- (ii) Hence find the correct value for  $t$ . Give a reason for your answer.

(4)

**(Total 12 marks)**

4. Three points are given A(0, 4), B(6, 0) and C(8, 3).
- (a) Calculate the gradient (slope) of line AB. (2)
- (b) Find the coordinates of the midpoint, M, of the line AC. (2)
- (c) Calculate the length of line AC. (2)
- (d) Find the equation of the line BM giving your answer in the form  $ax + by + d = 0$  where  $a$ ,  $b$  and  $d \in \mathbb{Z}$ . (5)
- (e) State whether the line AB is perpendicular to the line BC showing clearly your working and reasoning. (3)

**(Total 14 marks)**

5. Raul, in house R, is directly across the lake from Sylvia, in house S. The houses are two kilometres apart. When both Raul and Sylvia are facing due north, they see a speedboat B in the lake between the two houses. Raul in house R can see the boat at  $35^\circ$  east of where he is facing. Sylvia in house S can see the same boat at  $65^\circ$  west of where she is facing.

- (a) Copy and complete the diagram below, indicating which is the  $35^\circ$  angle, and which is the  $65^\circ$  angle.

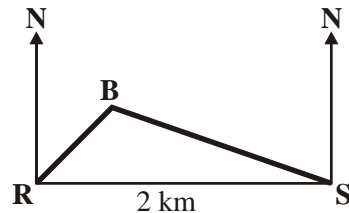


diagram not to scale

(2)

- (b) (i) Calculate the size of  $\hat{RBS}$ .

- (ii) At this moment, how far is the boat (B) from Raul's house (R)?  
Please give your answer to the nearest 100 metres.

(5)

- (c) Raul and Sylvia then see a sailboat on the lake at point Q, which is 2.6 km from Raul (R) and 3.5 km from Sylvia (S). Calculate the size of  $\hat{RQS}$  at that moment, giving your answer to the nearest degree.

(4)

(Total 11 marks)