1.
Faye went for a run.
The distance-time graph below shows her journey.
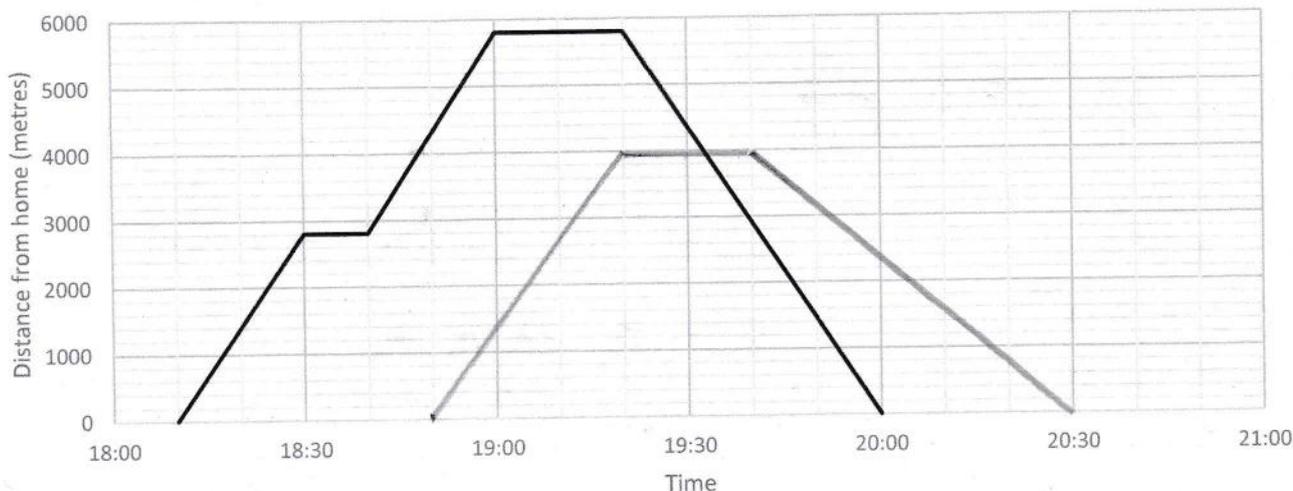
(a) What time did Faye leave home?

$18:10$

(1)

(b) How many minutes did Faye spend resting during the run?

$10 + 20 = 30$ minutes

(1)

(c) How many metres did Faye run in total?

$5,800 \times 2 = 11,600$ metres

(1)

(d) Work out Faye's average speed between 19:20 and 20:00, in kilometres per hour.

Distance $= 5.8$ km
Time $= 2/3$ hours

Speed $= \dfrac{5.8}{2/3} = 8.7$ km/h

(2)

Faye's housemate, Lisa, also went for a run.
She left home at 18:50, ran 4,000 metres in 30 minutes before stopping for a 20-minute rest.
She then ran back home at an average speed of 4.8 kilometres per hour.

(e) Use the information to plot Lisa's run on the same axis.

Distance $= 4$ km
Speed $= 4.8$ km/h

Time $= \dfrac{4}{4.8} = \dfrac{5}{6}$ hours $= 50$ minutes

(3)

(f) What time did Lisa return home?

$20:30$

(1)

2.
An iterative formula, U_n, is given by the formula $U_{n+1} = 2U_n^2 + 3U_n$.

Given that $U_1 = -1$, find U_{100}.

$U_2 = 2 \times U_1^2 + 3 \times U_1 = 2 \times (-1)^2 + 3 \times -1 = 2 - 3 = -1$

$U_3 = 2 \times (-1)^2 + 3 \times -1 = -1$

The sequence continues as -1.

$U_{100} = -1$

(2)

3.

$e \propto r^2$.

e	960	~~4860~~	~~6750~~ 6615
r	4	9	10.5

Complete the table.

$e = Kr^2$

$960 = k \times 4^2$

$960 = 16k$

$k = 60$

$e = 60r^2$

$r = 9, \; e = 60 \times 9^2 = 4,860$

$e = 6615, \; 6615 = 60r^2$

$110.25 = r^2$

$r = 10.5$

(4)

4.
Find the area of the triangle XYZ, to the nearest square centimetre.
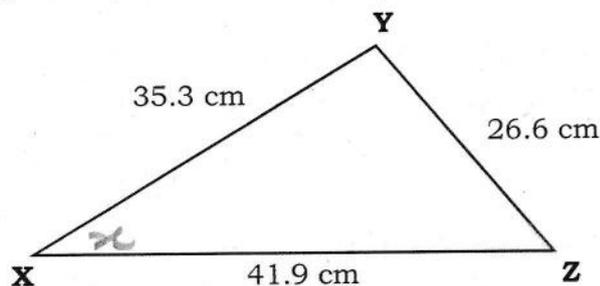
Find one of the angles:

$26.6^2 = 35.3^2 + 41.9^2 - 2 \times 35.3 \times 41.9 \times \cos x$

$707.56 = 3001.7 - 2958.14 \cos x$

$-2294.14 = -2958.14 \cos x$

$0.7755\ldots = \cos x$

$x = \cos^{-1}(0.7755\ldots)$

$= 39.14647117°$

$\frac{1}{2} \times 35.3 \times 41.9 \times \sin x$

$= 466.872\ldots$

$= 467 \text{ cm}^2$

(5)