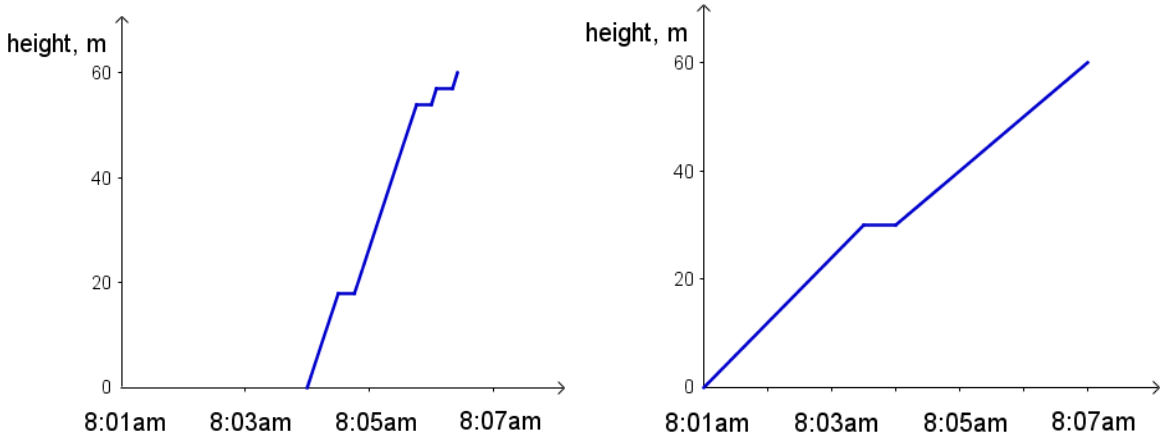
Section 1: Solving problems

Exercise level 2

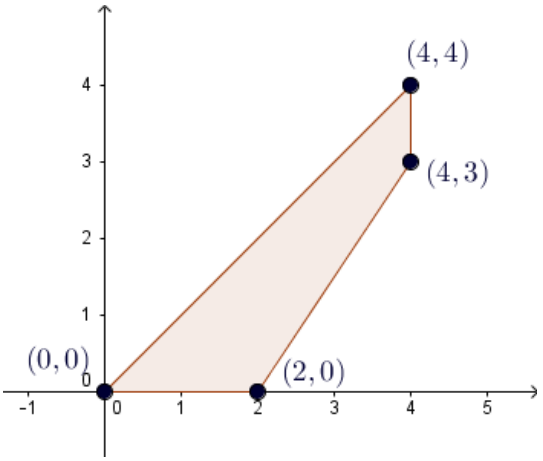
1. Two work colleagues arrive on the ground floor of a building at 8.01 am for a meeting on the twentieth floor. The twentieth floor is 60 m above ground level. One decides to take the stairs, the other the lift.



They both arrive on the twentieth floor at 8.07 am. In the meeting room they sketch graphs showing their height above the ground in terms of time between 8.01 am and 8.07 am.

Which graph do you think shows the person who took the lift? Why? What assumptions might have been made in drawing these graphs?

2. Calculate the shaded area in the diagram below:



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3. The first part of a table is shown below. Which row of the table contains the number 2020?

Row			
1	5	10	15
2	20	25	30
3	35	40	45
4	50	55	60
5	65	70	75

4. Currently, you have a job in a local cafe working for 7 hours each Saturday at £4 per hour. You are given lunch for free in the café.

   You have the offer of a new job, working for 6 hours each Saturday, but at £6 per hour. This job is at the library where lunch in not provided. You will have to buy lunch at £3.

   To get to the library you will need use the train. Assuming you are only concerned about maximising your income after expenses and that you accept the new job what can you deduce about the train fare?

   Is it realistic to assume that you are only concerned about maximising income after expenses in making the decision to take the new job? What factors, other than income, might someone consider when making this kind of decision?

5. The numbers below are equally spaced on a number line.

   (i) Find z in terms of x and y.
   (ii) Find x in terms of w and z

6. Two fifteen year olds are trying to estimate what percentage of their life they have spent at school.

   Jake says: *"I started school when I was 5, so that means I have been attending school for 10 years. 10 years out of 15 years is 66.6%. I have been at school for 66.6% of my life".*

   Mel says: *"I have been attending school for 10 years but school is only open for 39 out for 52 weeks per year.*
   This means I have been attending school for 39 × 10 = 390 weeks.
   I have been alive for 52 × 15 = 780 weeks.
   390 weeks out of 780 weeks is 50%. I have been at school for 50% of my life."

   Comment on the above. How might you improve these estimates? What is a reasonable estimate of the percentage of their life they have spent at school?

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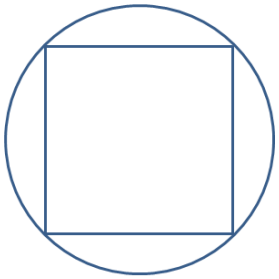
7. The diagram shows a square and a circle.



The corners of the square are on the circle.

The perimeter of the square is 20 cm.
Find the exact value of the area of the circle.

8. A list of numbers has average (mean) value 18. When the number 23 is added to the list the average becomes 19. How many numbers were in the list to begin with?

9. The three squares in the diagram are identical.
The perimeter of the shape shown is 32 cm.
What is the area of each square?