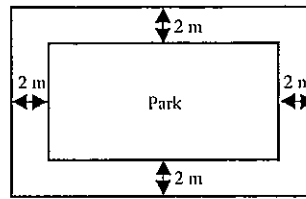**1** The length of a rectangular park is 2 times greater than its width.

The park is framed by sidewalk that is 2 m wide, as shown on the right.

The area of the park is increased by 136 m² if the sidewalk is included.
What is the area of the park without the surrounding sidewalk?

Work

Result :   The area of the park without the sidewalk is _____ m².

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2 Two men who install carpet must solve the following problem:

The length of one rectangular room, A, is 5 metres more than its width.
The width of a second rectangular room, B, is 2 metres more than the width of room A.
The length of room B is 7 metres more than the length of room A.
The difference between the areas of the two rooms is 51 m

What is the width in metres of room A?

Work
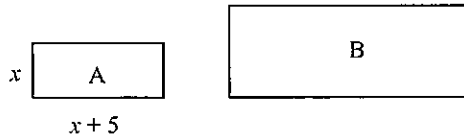
Result :   The width of room A is _____.

3   Wayne found the product of two consecutive odd numbers.
Had he found the product of the two preceding odd numbers, the answer would have been less than 304.
What two numbers did Wayne start with initially?

Work

Answer :   Wayne initially chose the numbers _____ and _____ .

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4   The cost of buying wedding invitation cards consists of a basic price and a fixed amount for each card printed.
Several examples of wedding invitation card prices are shown in the table below.

Number of cards printed	Cost ($)
100	80
125	98.75
275	211.25

A customer paid $168.50 for wedding invitation cards.
How many cards did the customer buy?

Show all your work.

Answer: The customer has bought _____ invitation cards.

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5   The weekly salaries of three workers are calculated as follows:

Alan's salary $S = 22h + 100$ where S: weekly salary in $
                                                       h: number of hours of work

Josée's salary   A basic salary of $80, plus $18 per hour
Jack's salary

Time (hours)	0	10	20	30	40
Salary ($)	0	200	400	600	800

One week, Alan worked 40 hours. Josée and Jack earned the same amount of money as Alan did that week.
How many more hours did Josée work than Jack that particular week?

Show all your work.

Answer   Josée worked _____ hours more than Jack.

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6   Andre works for a telecommunications firm. His salary for a 40-hour week is $880. For each hour of overtime, he is paid $33.
Carol is a journalist. Her salary is calculated as follows:

Number of hours worked	7	14	21	28	35	42	...
Salary ($)	147	294	441	588	735	882	...

Last week Andre's pay amounted to $1276. That week, Carol worked the same number of hours as Andre.
What was Carol's salary?

Show all your work.

Answer: Carol's salary is $_____ .

7 Oliver and Paula are training for a race. They run on the track around the school soccer field every day. The soccer field is 25 metres wide and $(8x + 3)$ metres long. The width of the running track is (x) metres. Oliver runs along the outside edge of the track and Paula keeps to the inside edge of the track.

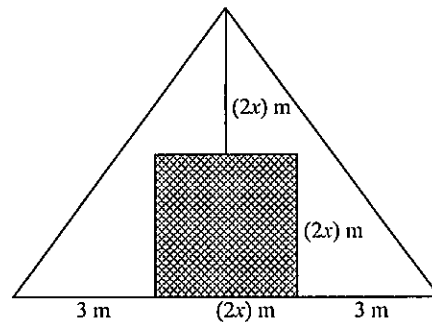After one full lap around the track, Oliver has run 32 metres more than Paula.
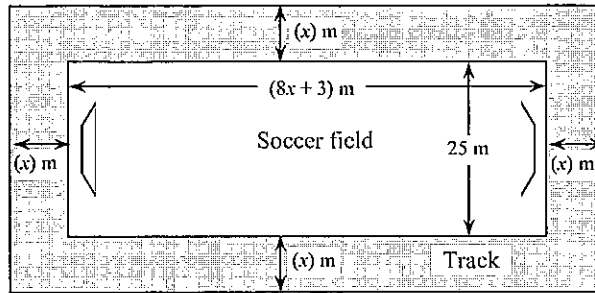
What is the length of the soccer field, in metres?

Show all your work.
Answer: The length of the soccer field is _____ m.

8 The triangular face of a garage is grey and white. The area of the white section is 60 m^2.

What is the numerical area of the grey section of the garage?

Show all your work.
Answer: The area of the grey section is _____ m^2.

1- Contents

Question	Item	Objective	Type	Skill
1	0010	ALG.03	Extended answer	Problem solving
2	0230	ALG.03	Extended answer	Problem solving
3	0286	ALG.03	Extended answer	Problem solving
4	0497	ALG.02	Extended answer	Problem solving
5	0528	ALG.02	Extended answer	Problem solving
6	0555	ALG.02	Extended answer	Problem solving
7	0567	ALG.03	Extended answer	Problem solving
8	0573	ALG.03	Extended answer	Problem solving
9	0647	ALG.02	Extended answer	Problem solving
10	0670	ALG.02	Extended answer	Problem solving
11	2070	ALG.03	Extended answer	Applications
12	2160	ALG.03	Extended answer	Problem solving
13	2208	ALG.04	Extended answer	Problem solving

2- Correction key

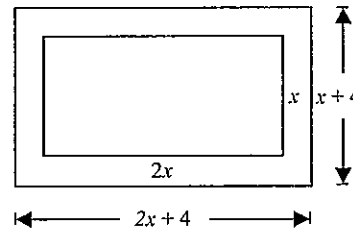**1** Work : (example)
Area of park without sidewalk
$$x(2x) = 2x^2$$
Area of park with sidewalk
$$(x + 4)(2x + 4) = 2x^2 + 12x + 16$$
Increase in area
$$2x^2 + 12x + 16 - 2x^2 = 12x + 16$$

Length of park without sidewalk
$$12x + 16 = 136$$
$$12x = 120$$
$$x = 10$$
Area of park without sidewalk.
$$x(2x) = 10 \times 20 = 200$$
Result   The area of the park without the sidewalk is 200 m².

2 Work : (example)
The dimensions of the rooms in metres

Room A	Room B
width : x	width : $x + 2$
length : $x + 5$	length : $x + 12$

The areas of the rooms in square metres
$$x(x + 5) = x^2 + 5x \quad \text{and} \quad (x + 2)(x + 12) = x^2 + 14x + 24$$
The difference between the areas
$$x^2 + 14x + 24 - x^2 - 5x = 9x + 24$$
The difference between the areas is 51 m²
$$9x + 24 = 51$$
$$9x = 27$$
$$x = 3$$
Result   The width of room A is 3 metres.

3 Example of an appropriate solution
Let $x , x + 2 , x + 4 , x + 6$, be four consecutive odd numbers
Product of the initial 2 odd numbers
$$(x + 4)(x + 6) = x^2 + 10x + 24$$
Product of the 2 preceding odd numbers
$$x(x + 2) = x^2 + 2x$$
Difference between products
$$x^2 + 10x + 24 - (x^2 + 2x) = 304$$
$$8x + 24 = 304$$
$$8x = 280$$
$$x = 35$$
Other odd numbers
$$x + 2 = 37$$
$$x + 4 = 39$$
$$x + 6 = 41 \qquad\qquad \text{(Wayne had initially chosen the 2 larger numbers)}$$

Answer   Wayne initially chose the numbers 39 and 41.

4 Example of an appropriate method
Rate of change
$$\frac{98.75 - 80}{125 - 100} = \frac{18.75}{25} = 0.75$$
Base price
$$80 = 0.75 \times 100 + b$$
$$5 = b$$
Number of invitation cards printed
$$168.50 = 5 + 0.75x$$
$$163.50 = 0.75x$$
$$218 = x$$
Answer: The customer bought 218 invitation cards.

5 Example of an appropriate solution
Alan's salary after 40 hours of work
$$S = 22h + 100$$
$$S = 22 \times 40 + 100$$
$$S = 980$$
Number of hours Josée worked
$$S = 18h + 80$$
$$980 = 18h + 80$$
$$900 = 18h$$
$$\frac{900}{18} = h$$
$$50 = h$$
Number of hours Jack worked
Hourly rate: $\dfrac{200 - 0}{10 - 0} = 20$

Time required to earn \$980: $980 \div 20 = 49$ hours
Difference in hours worked
$$50 - 49 = 1$$
Answer: Josée worked one hour more than Jack.

6 Example of an appropriate solution
Andre's number of overtime hours
$$S = 880 + 33h$$
$$1276 = 880 + 33h$$
$$33h = 396$$
$$h = 12$$
Andre worked $40 + 12 = 52$ hours
Carol's hourly rate
$$\frac{294 - 147}{14 - 7} = 21$$
Carol's salary
$$52 \times 21 = 1092$$
Answer: Carol's salary is \$1092.

7 Example of an appropriate solution
Calculate perimeter of inner edge of the track
$$P_I = 2(8x + 3) + 2(25)$$
$$= 16x + 6 + 50 = (16x + 56) \text{ m}$$
Calculate perimeter of outer edge of the track
$$P_O = 2(8x + 3 + 2x) + 2(25 + 2x)$$
$$= 16x + 6 + 4x + 50 + 4x$$
$$= (24x + 56) \text{ m}$$
Difference between perimeters
$$d = (24x + 56) - (16x + 56)$$
$$= (8x) \text{ m}$$
After 1 lap, the difference is 32 m
$$8x = 32$$
$$x = 4$$
Length of the soccer field
$$8x + 3 = 8(4) + 3 = 35 \text{ m}$$
Answer: The length of the soccer field is 35 m.

8 Example of an appropriate solution
Full area of front of garage
$$A_T = \frac{(4x)(2x + 6)}{2} = \frac{8x^2 + 24x}{2} = 4x^2 + 12x$$
Area of grey section
$$A_G = (2x)(2x) = 4x^2$$
Area of white section
$$A_w = A_T - A_G = 4x^2 + 12x - 4x^2 = 12x$$
Therefore $12x = 60$
$$x = 5$$
Area of grey section
$$A_G = 4(5)^2 = 100 \text{ m}^2$$
Answer: The area of the grey section is 100 m².