
Baseball Jerseys

Bill is going to order new jerseys for his baseball team.

The jerseys will have the team logo printed on the front.

Bill asks 2 local companies to give him a price.



1. 'Print It' will charge \$21.50 each for the jerseys.

Using n for the number of jerseys ordered and c for the total cost in dollars, write an equation to show the total cost of jerseys from 'Print It'.

2. 'Top Print' has a one off setting up cost of \$70 and then charges \$18 for each jersey.

Using n to stand for the number of jerseys ordered and c for the total cost in dollars, write an equation to show the total cost of jerseys from 'Top Print'.

3. Use the two equations from questions 1 and 2 to figure out how many jerseys Bill would need to order for the price from 'Top Print' to be less than from 'Print It'.

Explain how you figured it out.

4. Bill decides to order 30 jerseys from 'Top Print'.

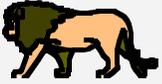
How much more would the jerseys have cost if he had bought them from 'Print It'?

Show all your calculations.

A Day Out

Mr. Richards, a teacher from Bosworth School, plans to take **30** pupils on a school trip.

Here are the places they could visit.

Growlets Zoo  36 miles from Bosworth Entrance fee \$2.50 per person	Prison Museum  30 miles from Bosworth Entrance fee \$6 per person	Space Science Show  10 miles from Bosworth Entrance fee \$10 per person
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The class vote on which place to visit.

Here are the results:

Name	First Choice	Second choice
Olivia	Zoo	Space show
Grace	Space show	Prison museum
Jessica	Prison museum	Zoo
Ruby	Zoo	Space show
Emily	Space show	Prison museum
Sophie	Prison museum	Zoo
Chloe	Prison museum	Space show
Lucy	Prison museum	Space show
Lily	Space show	Prison museum
Ellie	Space show	Prison museum
Ella	Zoo	Space show
Charlotte	Space show	Prison museum
Katie	Space show	Prison museum
Mia	Zoo	Space show
Hannah	Zoo	Space show

Name	First Choice	Second choice
Jack	Prison museum	Zoo
Thomas	Zoo	Prison museum
Joshua	Zoo	Prison museum
Oliver	Space show	Prison museum
Harry	Prison museum	Zoo
James	Zoo	Space show
William	Space show	Space show
Samuel	Zoo	Prison museum
Daniel	Zoo	Space show
Charlie	Prison museum	Prison museum
Benjamin	Space show	Zoo
Joseph	Zoo	Prison museum
Callum	Zoo	Prison museum
George	Prison museum	Space show
Jake	Space show	Prison museum

Here are some further facts about the trip.

The bus company charge \$6 per mile. The school fund will pay the first \$200 of the trip. Teachers will go free. Each pupil will pay the same amount.

- Taking both first and second choices into account, where should they go for the trip?
Explain clearly how you make your decision.
- How much will each person need to pay to go on the trip you have chosen?
Explain carefully how you decide.

A Day Out (continued)

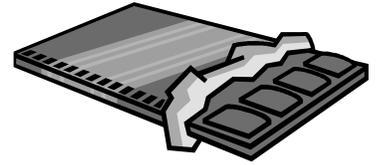
Candy Bars

A group of friends are planning to sell candy bars at the school shop.

They conduct a small survey among 30 people, asking the question:

How many candy bars do you eat in a typical week ?

Here are their results:



Male 1 bar	Female 4 bars	Male 5 bars	Female 1 bar	Male 2 bars	Male 25 bars
Male 13 bars	Female 0 bars	Male 2 bars	Male 9 bars	Male 6 bars	Female 16 bars
Female 14 bars	Male 10 bars	Male 19 bars	Male 11 bars	Female 1 bar	Male 0 bars
Male 1 bar	Male 3 bars	Female 10 bars	Male 25 bars	Female 16 bars	Male 13 bars
Female 30 bars	Male 8 bars	Male 2 bars	Male 0 bars	Male 28 bars	Female 0 bars

1. Draw graphs or charts to compare the results for males and females.

Candy Bars continued

2. Chris says:

“ We have found that the total number of candy bars eaten by all the males is 183, and the total number eaten by all the females is 92. In general, this means that men eat more candy bars than women.”

(a) Give two reasons why Chris is wrong in his reasoning.

(b) Write **one** conclusion (comparing males and females) that is supported by the data.
Show any work you do.

Suzi's Company

Suzi is the chief executive of a small company, TechScale, which makes technical instruments. Fifteen people, including Suzi, work in the company. The table shows the jobs and their annual salaries.

<i>Job Title</i>	<i>Number of people</i>	<i>Annual salary</i>	<i>Total</i>
Chief Executive	1	\$100 000	\$100 000
Marketing Manager	1	\$80 000	
Production Manager	1	\$80 000	
Technician	3	\$50 000	\$150 000
Office worker	2	\$40 000	\$80 000
Assembly worker	5	\$30 000	
Cleaner	2	\$20 000	
<i>Total</i>	15	<i>Total</i>	

1. a. Complete the final column of the table to find the total annual salary bill for TechScale.

- b. Use your answer to question 1a to calculate the mean annual salary for the 15 employees in the company. Give your answer correct to the nearest \$.

\$ _____

Show your calculations.

2. John looks at the table and says, “The mode of the salary at TechScale is eighty thousand dollars a year.”

a. What mistake has John made?

b. What is the correct mode of the salary?

3. a. What is the median annual salary at TechScale?

b. Explain how you figured it out.

4. Which of the three averages, mean, median or mode, would you use to show that the average wage at TechScale is very good?

Explain your answer.

5. Last year, TechScale did not do very well so Suzi decided not to pay herself any salary for a year.

a. Which of the averages (mean, median and mode) will **not** change?

A Sense of Scale

1. Here is a recipe for making 4 pancakes:

6 tablespoons flour

$\frac{1}{4}$ pint milk

$\frac{1}{4}$ pint water

1 pinch salt

1 egg



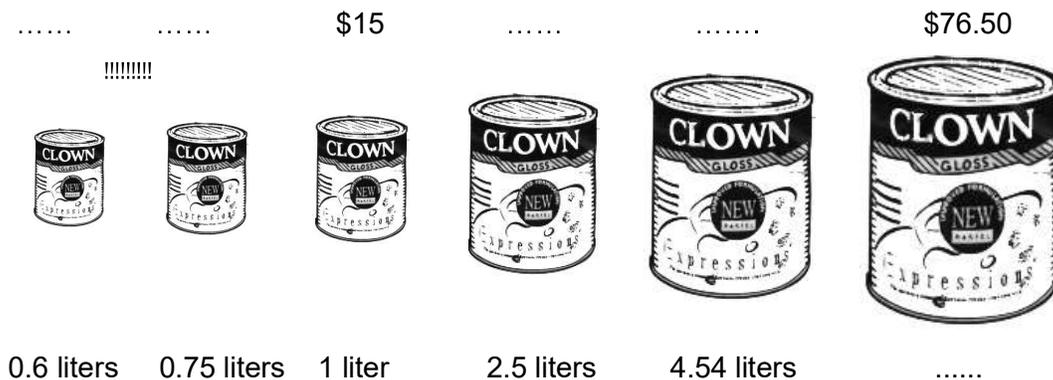
You want to make 10 pancakes.

a. How much flour do you need?

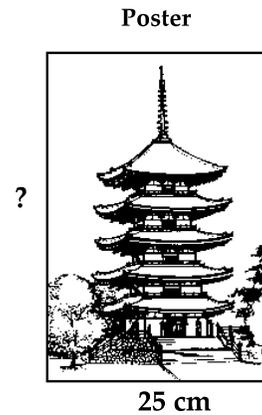
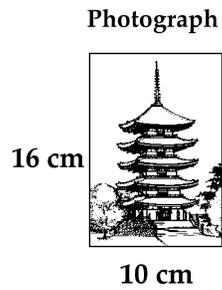
b. How much milk do you need?

2. Calculate the prices of the paint cans.

The prices are proportional to the amount of paint in the can.



3. The photograph is enlarged to make a poster.
The photograph is 10cm wide and 16cm high.



- a. The poster is 25cm wide.
How high is the poster?

- b. The building on the poster is 30cm tall.
Is it possible to figure out how tall the building is on the photograph?
If you think it is possible, show how. If you think it is not, explain why.

Car Skid Marks

Dek and Mani are traffic accident investigators.
 Their job is to find out how and why accidents happen.
 To do this they gather evidence from the scenes of accidents.



When a car suddenly brakes to a stop, it can leave skid marks.
 These marks can be used to figure out the speed of the car.
 This might give evidence that the driver was going over the speed limit.

On a dry test track, a car is driven at different speeds, in miles per hour (mph).
 Each time it brakes as hard as possible.
 The skid length is then measured in feet.
 Here are the results:

Speed (mph)	0	19	27	29	37	39	49	54	56	60	66	69	74	76	80	85	89	93	98
Length (feet)	0	20	37	42	61	68	100	120	131	150	180	200	230	240	270	300	330	360	400

The relationship shown in the table looks complicated, so Dek and Mani both try to work out a 'rule of thumb' for estimating the speed of a car from the length of the skid marks:

Dek



I've got an easy rule.
 Halve the length of the skid mark in feet.
 This gives an estimate for the speed in miles per hour.

Mani



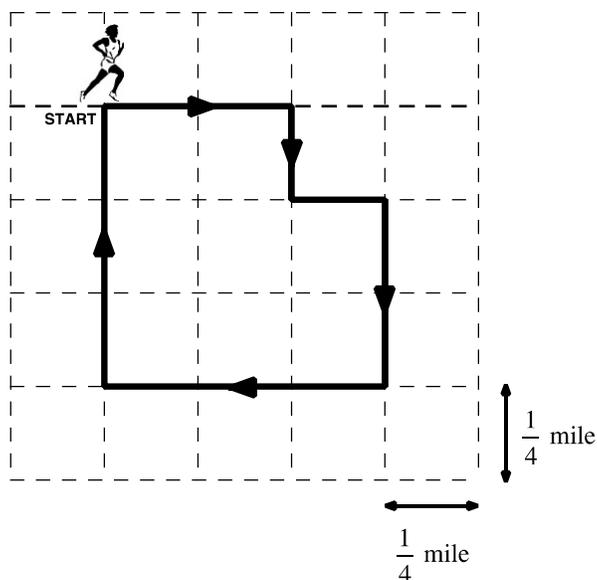
My rule is more complicated.
 I use the formula:

$$y = \frac{x}{4} + 30$$

y is the speed of the car in miles per hour
 x is the length of the skid mark in feet

A Race

Amy and Rebecca are running in a road race. The map, drawn to scale, shows the route of the race:



The race consists of four laps of the route and Amy and Rebecca run clockwise along the route at a constant speed.

It takes Amy 8 minutes to run a mile.

Rebecca takes 12 minutes to run a mile.

1. Mark on the map where Rebecca 'R' and Amy 'A' will be one hour into the race.
Explain how you know.

2. Will one runner 'lap' the other runner at some point in the race?
If so, where? Label this place 'X' and explain your reasoning.
If not, explain how you know.

Security Cameras

A shop owner wants to prevent shoplifting.

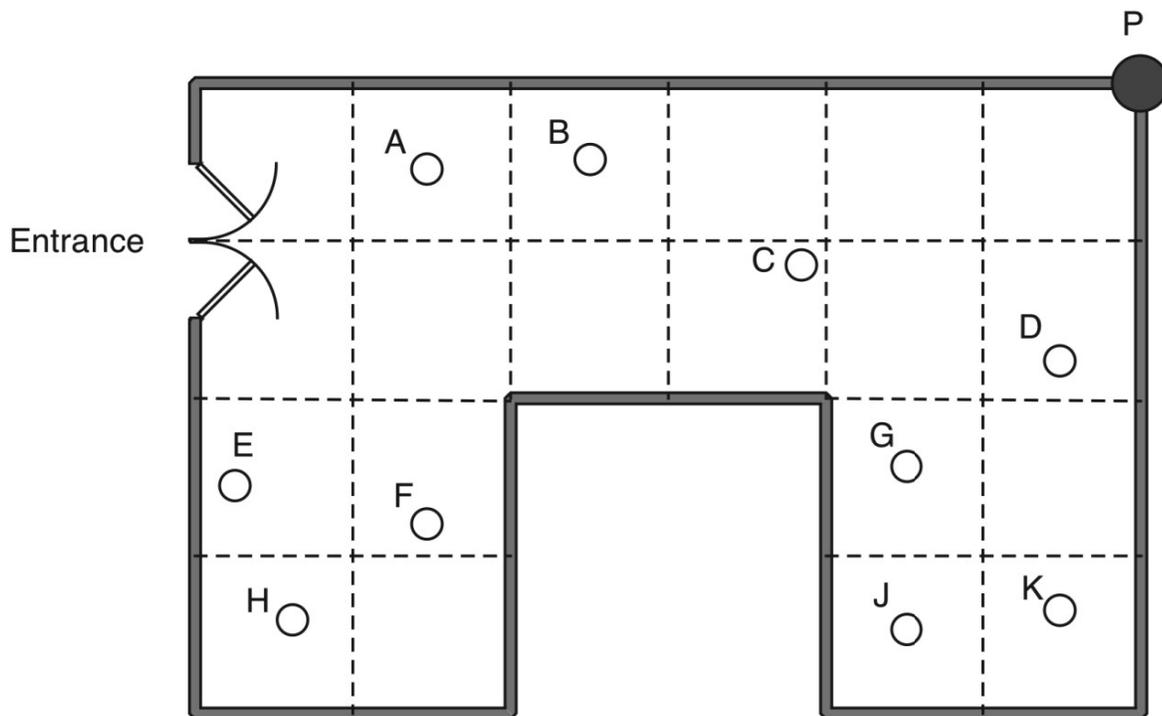
He decides to install a security camera on the ceiling of his shop.

The camera can turn right round through 360° in all directions.

The shop owner places the camera at point P, in the corner of the shop.

The plan view below shows where ten people are standing in the shop.

Plan view of the shop:

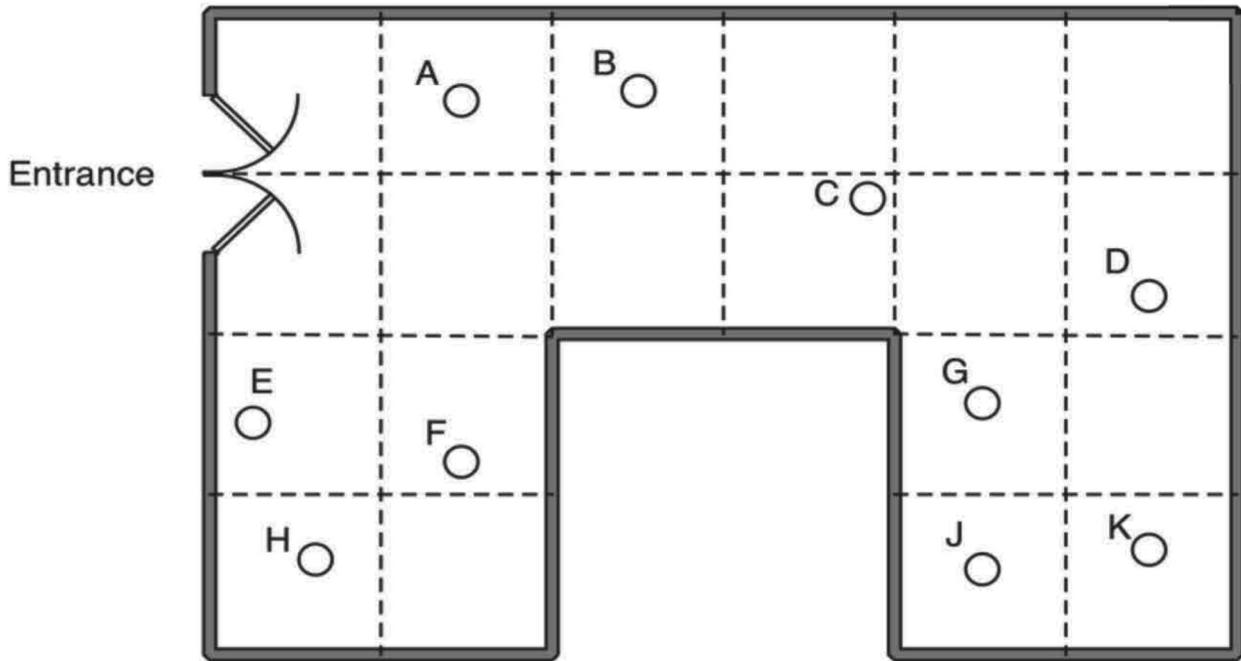


1. Which people in the shop cannot be seen by the camera at P?
Explain your answer, showing clearly on the diagram how you know.

2. The shop owner says, “15% of the shop is hidden from the camera.”
Show clearly that he is correct.

Security Cameras (continued)

3. The shop owner decides to move the camera so that it can see as much of the shop as possible.
- a. On the plan view below show the best place for the camera so that it can see as much of the shop as possible.



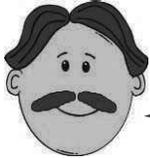
- b. Explain how you know that this is the best place for the camera. What percentage of the shop cannot be seen with the camera in this new position?

Hot and Cold

The exact method for converting a temperature in Celsius to a temperature in Fahrenheit is:



Harold comes from Europe and is visiting Merryl and Josh in the USA.



Harold

Hi! In Europe we use Celsius. I find Fahrenheit very confusing!

In the USA we use Fahrenheit. A quick way to convert from Celsius to Fahrenheit is just to double and add 30.



Merryl



Josh

I do it an even easier way – you just double the Celsius temperature to get the Fahrenheit temperature.

When does Merryl's way of converting between Celsius and Fahrenheit give a reasonable approximation?

When does Josh's way of converting between Celsius and Fahrenheit give a reasonable approximation?

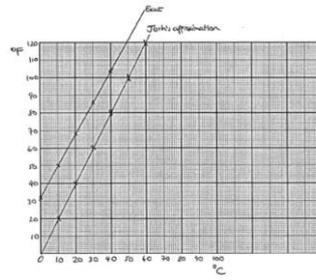
Explain your answers.

Three Approaches to Try:

Write a table:

Celsius temperature	Fahrenheit temperature	Meryl's approximation	How far out Meryl is
0	32	30	2
10	50	50	0
20	68	70	0
30	86	90	0
40	104	110	0
50	122	130	0

Draw a Graph:



Algebraically:

Correct: $F = 1.8C + 32$

Meryl: $M = 2C + 30$

Josh: $J = 2C$

where $C = \text{Temp in Celsius}$

Height error = $M - F = 0.2C - 2$

Josh error = $J - F = 0.2C - 32$

$0.2C - 2 < 0.2C - 32$

∴ Josh error is smaller than Meryl's.