

# Mathematics Assessment Program *MS - 4*

## Middle School Mathematics

### Time Allowed

Section A - 40 minutes; Section B - 40 minutes

These tasks give you a chance to show what you know and how you reason, and to solve mathematical problems.

Please show your work and reasoning in the spaces provided. Explain any assumptions you make.

**Try as many tasks as you can in the time given.  
If you get stuck on a task, move on to the next task.**

Name: _____	Male	Female
School: _____	City: _____	
Teacher: _____	Grade: _____	
Date: _____		

Do not write in the box below:

<b>MS-4</b>	Short Tasks	Buses	Historic Bicycle	Octagon Tile	Temperatures	A Day Out	Hot Under The Collar	Total

These tests were developed with support from the Bill and Melinda Gates Foundation

**Section A - 40 minutes**

---

## Short Tasks

---

1. John's collection contains US, Indian and British stamps. If the ratio of US to Indian stamps is 5 to 2, and the ratio of Indian to British stamps is 5 to 1, what is the ratio of US to British stamps?

\_\_\_\_\_

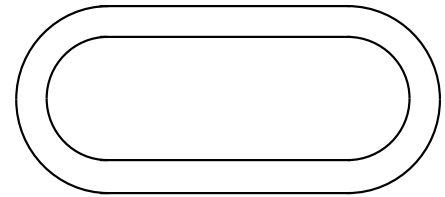
2. If  $x$  and  $y$  are positive integers, and  $3x + 2y = 13$ , what could be the value of  $y$ ?

\_\_\_\_\_

3. If the product of 6 integers is negative, at most how many of the integers can be negative?

\_\_\_\_\_

4. This is a diagram of a running track.  
The track is made up of straights and semicircles.  
The radius of the outside semicircle is 35 meters.  
The length of the outer perimeter is 400 meters.  
Find the length of the straights.



\_\_\_\_\_

5. A vendor has 15 helium balloons for sale: 7 are yellow, 5 are red, and 3 are green. A balloon is selected at random and sold. If the balloon sold is yellow, what is the probability that the next balloon, selected at random, is also yellow?

\_\_\_\_\_

# Buses

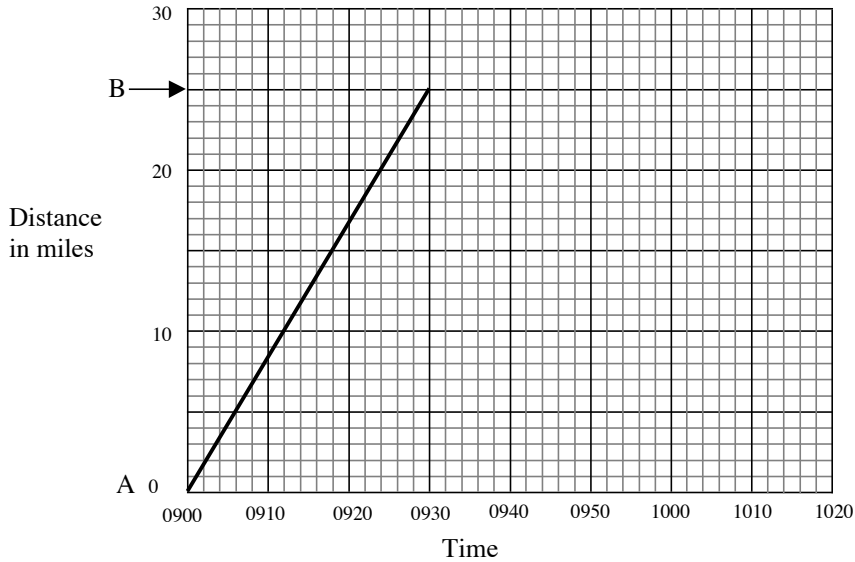
The diagram below is a distance-time graph.

1. The sloping line shows the journey of a bus from City A to City B.

The bus leaves City A at 9am (0900) and arrives at City B at 9:30am (0930)

a. How far is it from City A to City B? \_\_\_\_\_ miles

b. How long does the bus journey take? \_\_\_\_\_ minutes



2. Another bus leaves City B at 0900 and arrives at City A at 0930.

a. Draw a line on the diagram to show the journey of this second bus.

b. At what time do the two buses pass each other? \_\_\_\_\_

3. Buses leave City A and City B every 10 minutes during the morning, repeating the two journeys shown on your graph.

a. On your graph, draw a line to show the bus that leaves City A at 0920.

b. How many buses traveling in the opposite direction will this bus meet before it reaches City B?

Explain how you figured it out. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

c. How far is the bus from City A when it meets the first bus travelling in the opposite direction? \_\_\_\_\_

---

## Historic Bicycle

---

*The circumference of a circle,  $C = \pi d$ , where  $d$  is the diameter*

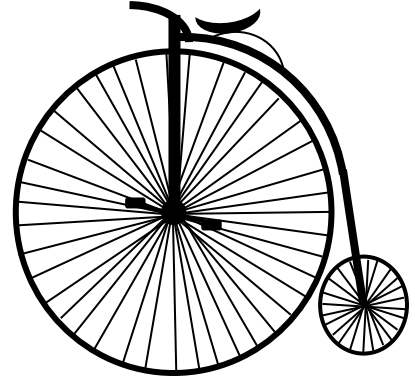
Basil saw a strange old bicycle at the museum.

It had one very big wheel and one very small one.

It was called an ‘Ordinary’ or a ‘Penny Farthing’.

At home Basil looked it up on the internet and found that

**the big wheel could have a 52 inch diameter and  
the small wheel could have an 18 inch diameter.**



1. What is the circumference of the big wheel?

Show how you figured it out.

\_\_\_\_\_ inches

2. How far would you travel in one turn of the big wheel?

Give your answer in feet and inches correct to the nearest inch.

Show how you figured it out.

\_\_\_\_\_ feet \_\_\_\_\_ inches

3. How many times must the cyclist turn the big wheel to travel 1 mile?

A mile is 1760 yards.

Give your answer to the nearest 10 turns.

Show how you figured it out.

---

4. How many times does the small wheel turn when the cycle travels 1 mile?

Show how you figured it out.

---

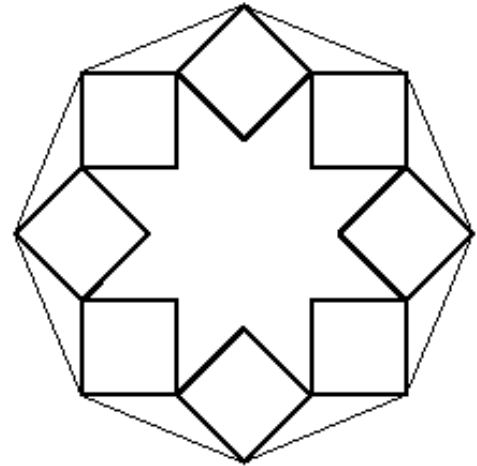
---

## Octagon Tile

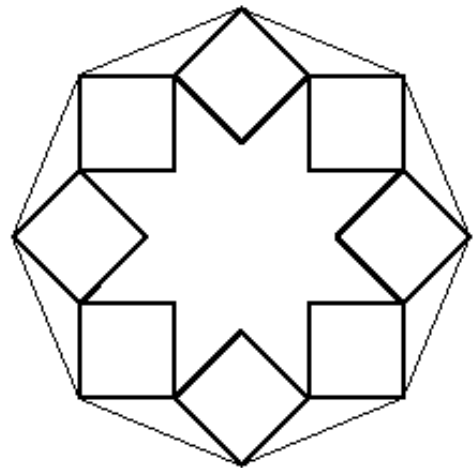
---

Here is a design for a tile in the shape of a regular octagon.

The design is made from eight squares all the same size placed symmetrically round the octagon.



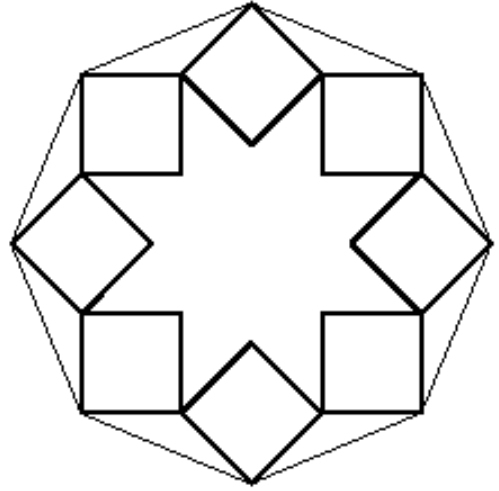
1. Join eight points in the diagram to make another regular octagon.



2. The inner sides of the squares form a 'star' in centre of the tile.

How many sides does the star have? \_\_\_\_\_

3. Draw in all the lines of symmetry of the star.



How many lines of symmetry does the star have? \_\_\_\_\_

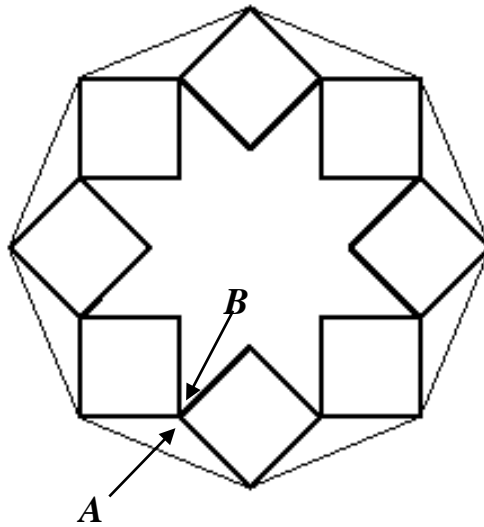
What is the angle between each line of symmetry and the next? \_\_\_\_\_  
 Explain how you know.

---



---

4.



Angle A is  $135^\circ$ . Explain why angle B is  $45^\circ$ .

---



---



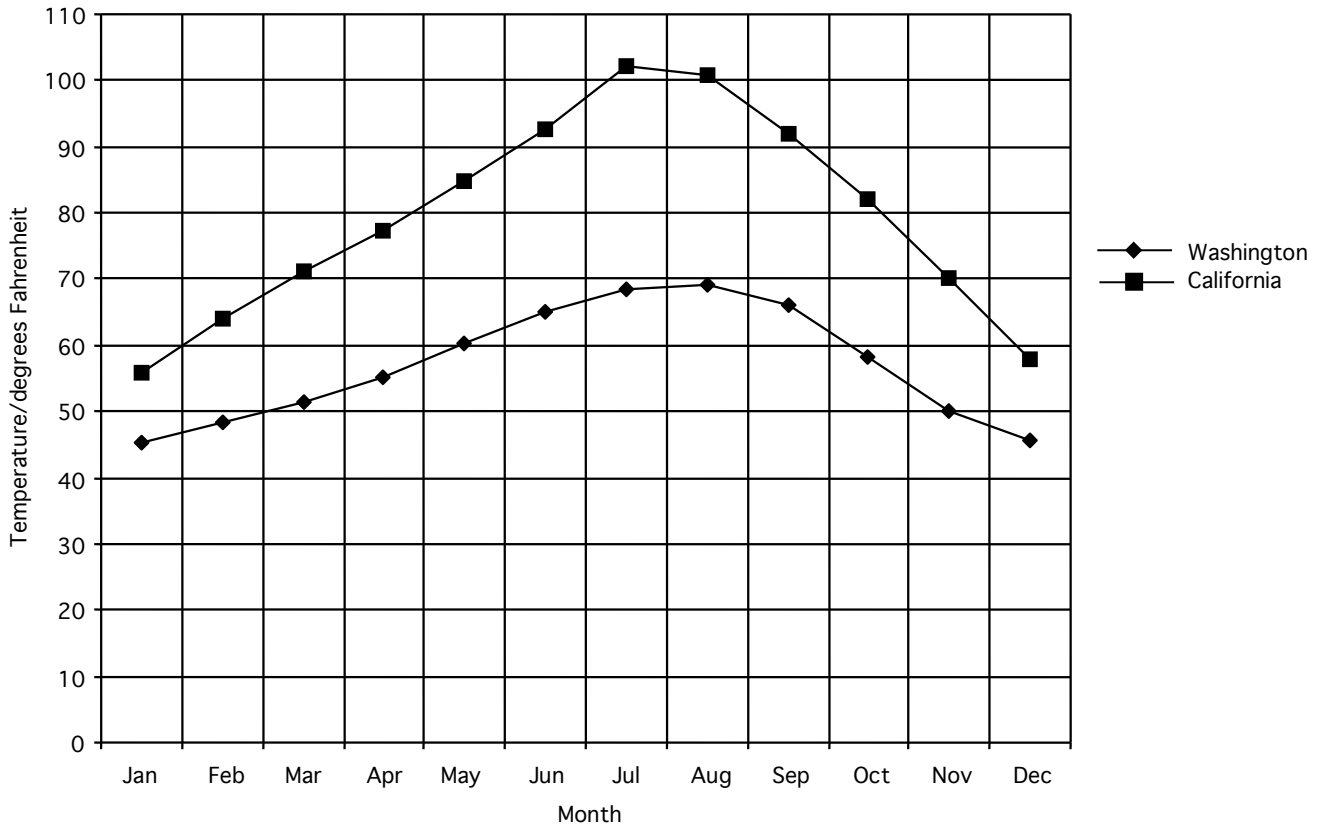


---

# Temperatures

---

This graph shows the highest average temperatures for each month of the year for one place in Washington and one place in California.

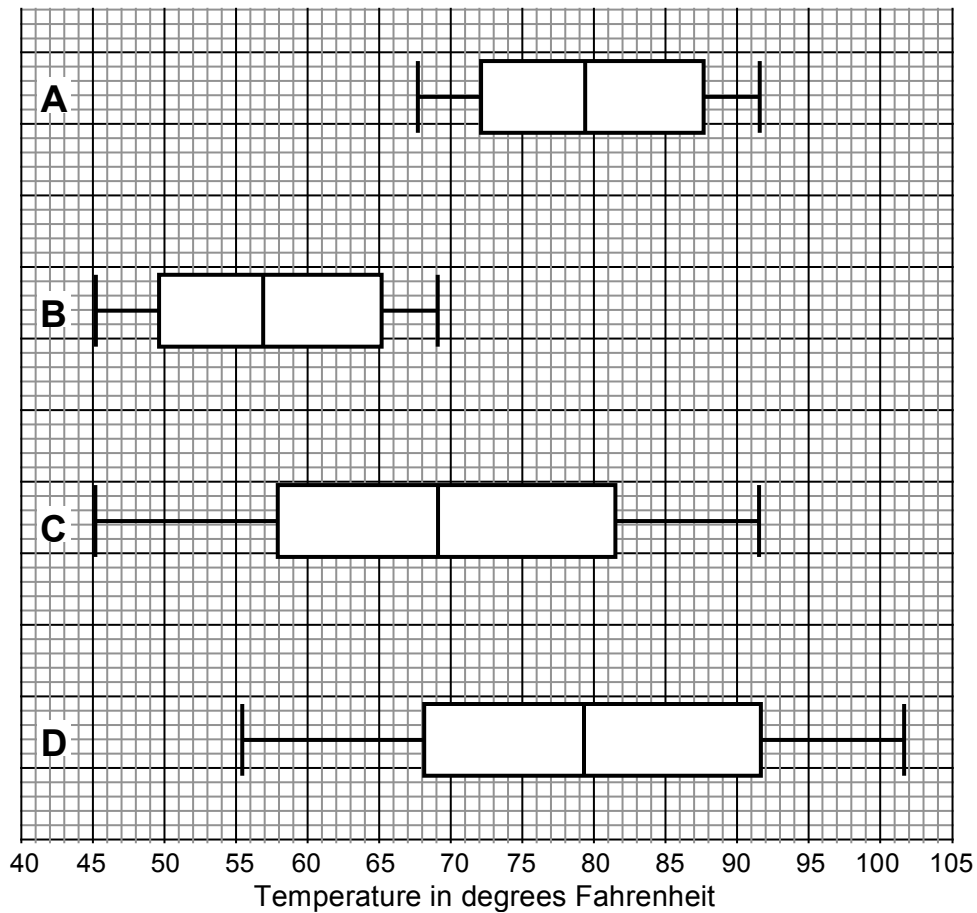


1. Write two statements about what is the same and what is different in the two sets of temperatures.

(i) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(ii) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Box and whisker temperature diagrams



2. Which of the four box diagrams shows the Washington temperatures? \_\_\_\_\_  
 Explain how you decided.

---



---

3. Which of the four box diagrams shows the California temperatures? \_\_\_\_\_  
 For which months of the year is the maximum monthly temperature for California between the upper and the lower quartiles?

---



---

Explain how you figured it out.

---



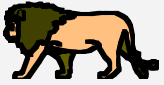


---

**This is a blank page**

**Section B - 40 minutes**

# 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.

<b>Growlets Zoo</b>  36 miles from Bosworth Entrance fee \$2.50 per person	<b>Prison Museum</b>  30 miles from Bosworth Entrance fee \$6 per person	<b>Space Science Show</b>  10 miles from Bosworth Entrance fee \$10 per person
--	--	---

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.

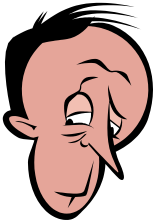
## A Day Out (continued)

---

## Hot Under The Collar

---

John and Anne are discussing how they change temperatures in degrees Celsius into degrees Fahrenheit.



John

The accurate way is to:  
multiply the Celsius figure by 9,  
then divide by 5, then add 32.



Anne

I have an easier method you can do in your head.  
I double the Celsius figure then add 30.  
That is near enough for most purposes.

1. If the temperature is  $20^{\circ}\text{C}$ , what is this in Fahrenheit?  
How far out will Anne be, if she uses her method?  
Show how you figured it out.

\_\_\_\_\_

2. For what temperatures does Anne's method give an answer that is too high? \_\_\_\_\_  
Explain your reasoning and show all your calculations.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Hot Under the Collar** (continued)