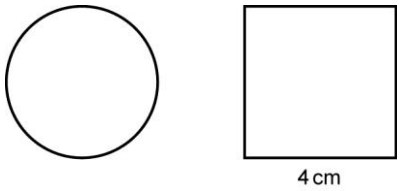
Name …… Class …… Date ……

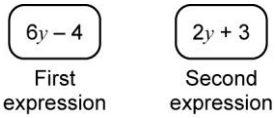
1 Geoff calculated that the mean age of the members of his badminton club was 16 years 8 months, and the range of their ages was 2 years 1 month.
A new member, aged 14 years 10 months, joins the club.
a Will the mean age of the members increase, decrease, stay the same, or is it impossible to tell?
Explain your answer.
b Will the range of ages increase, decrease, stay the same, or is it impossible to tell?
Explain your answer.

2 The circumference of the circle and the perimeter of the square are equal.
Calculate the radius of the circle.
Show your method.



3 Show that $3^2 + 2^3 = (3^2)^2 - 4^3$

4 Look at these expressions.



What value of y makes the first expression **twice** as great as the second expression?
Show your working.

5 Holly wrote the following:

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{p+q}$$

Show that Holly's statement is not correct.

6 I fill a glass with orange juice and lemonade in the ratio 1 : 5.
I drink $\frac{1}{5}$ of the contents of the glass, then I fill the glass using orange juice.
Now what is the ratio of orange juice to lemonade in the glass?
Show you working and write the ratio in its simplest form.,

7 A farmer keeps sheep and hens.
He has 84 creatures altogether.
Between them they have 288 legs.
Work out how many sheep and how many hens the farmer has.
Show your method.

8 A student wrote 'For all numbers, $(p + q)^2 = p^2 + q^2$'
Show that the student is wrong.
Could $(p + q)^2$ ever be the same as $p^2 + q^2$?
Explain your answer.

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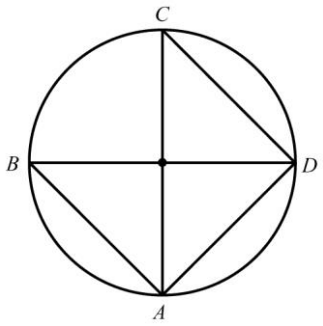
9 The diagram shows a circle with diameters AC and BD.



Prove that triangle ABD is congruent to triangle DCA.
Explain your method clearly.

10 The difference between two numbers is 4.
The difference between the squares of these two numbers is also 4.
Use an algebraic method to find a pair of numbers for which these statements are true.

11 a Each side of a square is increased by 5%.
By what percentage is the area of the square increased?

b The length of a rectangle is increased by 10%.
The width is decreased by 10%.
By what percentage is the area of the rectangle changed?

c A 20% increase followed by another 20% increase is not the same as a total increase of 40%.
What is the total percentage increase?
Show your working.

12 The lowest of four consecutive numbers is n.

a Prove that there are only two sets of four consecutive numbers where the sum of the four numbers is equal to the product of the highest and lowest numbers.

b Write down the two sets of four consecutive numbers.

13 The diagram shows a prism.

The volume of the prism is $12x^3 - 2x^2y - 2xy^2$

Show that the depth of the prism is $2x - y$