



Age 14+ Level ★★
Worksheet 1

1. Simultaneous Multiplying

If $a \times b = 2$, $b \times c = 24$, $c \times a = 3$ and a , b , and c are all positive, what is the value of $a + b + c$?

2. Well Read

In Miss Quaffley's class, one third of the pupils take a teddy bear to school. Last term, each boy borrowed 12 books from the library, each girl borrowed 17 books, and each teddy bear borrowed 9 books.

In total 305 books were borrowed.
How many girls are there in the class?

3. Square to a Rectangle

Kevin had some square patio tiles which he arranged to make a square. He decided to change it into a rectangle by making one of the sides 3 tiles shorter, and the other side 4 tiles longer.

To make this change, Kevin only needed to buy one extra tile.
What are the lengths of the sides of the rectangle?

4. Black and White Socks

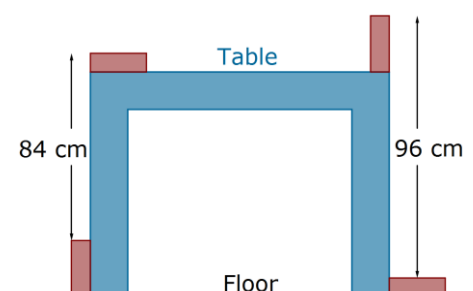
There are 20 black socks and n white socks in a drawer. When a sock is taken from the drawer, the probability that it is white is $\frac{1}{n}$.

What is the value of n ?

5. Table Height

Four identical blocks of wood are placed touching a table in the positions shown.

How high is the table?



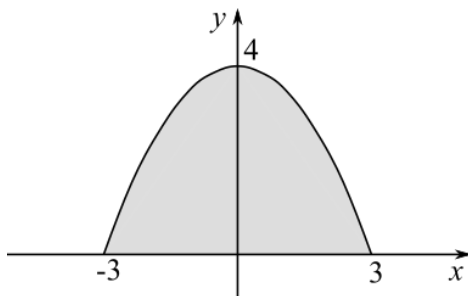
These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.



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Worksheet 2

1. Traffic Tunnel

A traffic tunnel is being planned. The diagram shows the cross-section of the tunnel. The shape of the tunnel is the same as the graph of $y = \frac{4}{9}(9 - x^2)$. All distances are in metres.



Which of these vehicles will fit through the tunnel?

- a) truck, 2.9 m high, 4 m wide
- b) coach, 3.4 m high, 3 m wide
- c) lorry, 3.9 m high, 2 m wide

2. Relative Angles

In triangle ABC, angle B is $\frac{3}{4}$ of the size of angle C and $1\frac{1}{2}$ times the size of angle A.

What is the size in degrees of angle B?

3. Thousands of X

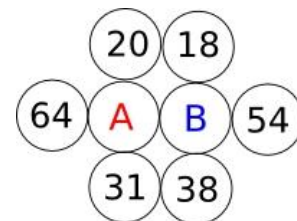
Solve the equation:

$$(x - 2013)(x - 2012) - (x - 2012)(x - 2011) = 0.$$

4. Average Surroundings

Ali (A) and Baba (B) are shown surrounded by six thieves. The thieves' ages are given.

Ali's age is the average of his four nearest neighbours', and so is Baba's. How old is Ali?



5. Tennis Training

After tennis training, Andy collected twice as many balls as Roger, and five more than Maria.

If they collected 35 balls in total, how many did Andy collect?

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.



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Worksheet 3

1. Alien Currency

On planet Zog, they use green and blue bank notes.
Three green notes and eight blue notes are worth 46 zogs.
Eight green notes and three blue notes are worth 31 zogs.
How many zogs are two green notes and three blue notes worth?

2. Fractions of Fractions

Two thirds of five sixths of a number X is the same as three quarters of four fifths of a number Y .

What is the value of $\frac{X}{Y}$ as a fraction in its lowest terms?

3. Packing Boxes

Harry, Christine and Betty are packing 36 boxes of chocolates.

- Harry and Christine would take 2 hours to pack the boxes
- Harry and Betty would take 3 hours
- Christine and Betty would take 4 hours

How many boxes does Christine pack in one hour?

4. Monetary Difference

Al, Bertie, Chris and Di have sums of money totalling £150.
Al and Bertie have £55 between them and Al and Chris have £65 between them.
What is the difference between the amounts that Al and Di have?

5. Big Fish

Granny caught a fish so big that she had to cut it into three pieces (head, body and tail) in order to weigh it.
The tail weighed 9kg.
The head weighed the same as the tail plus one third of the body.
The body weighed as much as the head and tail together.
How much did the whole fish weigh?

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Worksheet 4

1. Sum = Product = Quotient

How many pairs of numbers (a, b) exist such that the sum $a + b$, the product ab , and the quotient $\frac{a}{b}$ are all equal?

2. Near 10

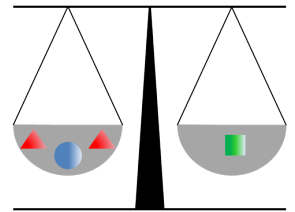
How many integers n exist such that the difference between $\sqrt{n}$ and 10 is less than 1?

3. Weighing Scales

Two pyramids and a sphere on one side of a pair of scales will just balance a cube on the other side.



A sphere and a cube together will just balance three pyramids.



How many spheres will balance a single pyramid?

4. Day of the Triffids

Jasmine spends exactly £120 on three types of plants.

Poison ivy plants cost £2 each.

Deadly nightshade plants cost £9 each.

Triffid plants cost £12 each.

She buys twenty plants in total, including at least one of each type.

How many truffids did she buy?

5. Algebraic Differences

If $6x - y = 21$ and $6y - x = 14$, what is the value of $x - y$?

6. Oldest and Youngest

Edith had nine children at regular intervals of 15 months.

If the oldest is now six times as old as the youngest, how old is the youngest child?

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