



# MATHEMATICS



**N.S. Yr. 4 P.60**

**Using related facts and doubling and halving.  
Use Factors.**

## Equipment

Paper, pencil,

# MathSphere

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### Concepts

This module is concerned with using facts about doubling and halving to simplify sums and aid in calculating the answers.

Types of problems covered:

To double 42, double 40 and then double 2.

To multiply by 4, double the number and double again. Similarly for 8, 16 etc.

To multiply by 5, multiply by 10 by shifting the digits one place to the left and halving the answer.

To multiply by 20, multiply by 10 by shifting digits and then double. Similarly for 40, 80 etc.

Double the facts of one multiplication table to another twice as large. Eg. double 3 times table to obtain 6 times table.

Given one lot of a number is the number itself, obtain values for  $2\times$ ,  $4\times$  etc by doubling.

Use combinations of facts to obtain more complex answers.

Eg.  $13 \times 13 = (13 \times 8) + (13 \times 4) + (13 \times 1)$

Use halving and halving again to find quarters and eighths of numbers.

Eg. One quarter of 68 is a half of a half of 68, which is 17.

As much of this work as possible should be done mentally, but some will have to be done on paper or the results recorded on paper, even if the working is done mentally.



If we want to double a number such as **24**, we can double the **20** and then double the **4**.

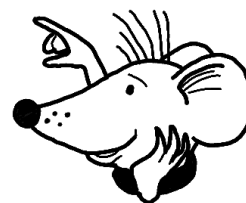
1. Try doubling these numbers using this idea:

a. 23   b. 34   c. 13   d. 24   e. 44   f. 42   g. 21   h. 32

2. Try doubling these more difficult numbers using this idea:

a. 46   b. 57   c. 38   d. 52   e. 75   f. 39   g. 28   h. 36

We can do the same thing with halving.  
Half of **38** is: half of **30** add half of **8**  
 $= 15 + 4$   
 $= 19$



3. Try halving these numbers using this idea:

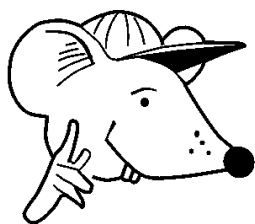
a. 28   b. 48   c. 26   d. 68   e. 84   f. 82   g. 62   h. 86

4. Try halving these more difficult numbers using this idea:

a. 58   b. 74   c. 38   d. 52   e. 96   f. 58   g. 76   h. 92

5. Using these ideas, see how quickly you can work out these little beauties!

a.  $33 \times 2$    b.  $49 \times 2$    c.  $26 \div 2$    d.  $37 \times 2$    e.  $98 \div 2$    f.  $54 \div 2$   
g.  $35 \times 2$    h.  $17 \times 2$



Don't forget, if we want to double a number such as **43**, we can double the **40** and then double the **3**.

1. Try doubling these numbers using this idea:

a. 35   b. 24   c. 31   d. 42   e. 43   f. 25   g. 14   h. 44

2. Try doubling these more difficult numbers using this idea:

a. 56   b. 28   c. 39   d. 47   e. 77   f. 48   g. 37   h. 26

We can do the same thing with halving.  
Half of **56** is: half of **50** add half of **6**  
 $= 25 + 3$   
 $= 28$



3. Try halving these numbers using this idea:

a. 24   b. 62   c. 44   d. 82   e. 88   f. 60   g. 86   h. 68

4. Try halving these more difficult numbers using this idea:

a. 36   b. 56   c. 72   d. 34   e. 78   f. 92   g. 94   h. 56

5. Using these ideas, see how quickly you can work out these little beauties!

a.  $45 \times 2$    b.  $57 \times 2$    c.  $38 \div 2$    d.  $46 \times 2$    e.  $68 \div 2$    f.  $36 \div 2$   
g.  $47 \times 2$    h.  $29 \times 2$



We can multiply by **four** by doubling and doubling again, like this:

$23 \times 4$  is: double **23** and double the answer.

That comes to **92**. Brilliant!

1. Multiply these numbers by **4** using this idea:

a. 24   b. 52   c. 17   d. 28   e. 42   f. 35   g. 22   h. 18

2. Now try multiplying these numbers by **4** using the same idea:

a. 55   b. 39   c. 26   d. 34   e. 63   f. 27   g. 46   h. 33

3. By doubling and doubling again, fill in the boxes:

23 →  →

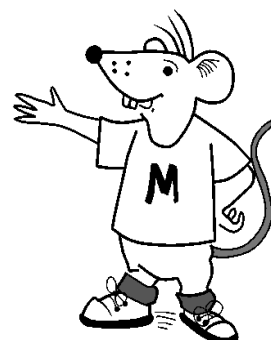
56 →  →

37 →  →

65 →  →

39 →  →

Go carefully now!





We can multiply by **four** by doubling and doubling again, like this:  
 $27 \times 4$  is: double **27** and double the answer.  
That comes to **108**. Brilliant!

1. Multiply these numbers by **4** using this idea:

a. 32   b. 22   c. 31   d. 43   e. 26   f. 18   g. 19   h. 24

2. Now try multiplying these numbers by **4** using the same idea:

a. 64   b. 72   c. 38   d. 27   e. 17   f. 45   g. 37   h. 25

3. By doubling and doubling again, fill in the boxes:

41 →  →

63 →  →

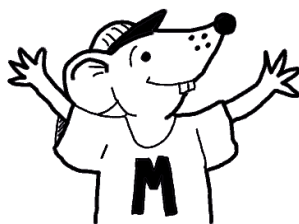
52 →  →

73 →  →

34 →  →

Go carefully now!





If we want to multiply by **5**,  
we can multiply by **10** and  
then halve the answer.

**Eg.  $24 \times 5 = 240 \div 2 = 120$**

1. Try multiplying these numbers by **5** using this idea:

a. 26   b. 32   c. 18   d. 16   e. 44   f. 28   g. 42   h. 64

2. Try multiplying these more difficult numbers by **5** using this idea:

a. 54   b. 39   c. 25   d. 56   e. 65   f. 29   g. 48   h. 47

We can do something similar with  
multiplying by **20**.  
Multiply by **10** and then double the answer.  
**Eg.  $34 \times 20 = 340 \times 2 = 680$**



3. Try multiplying these numbers by **20** using this idea:

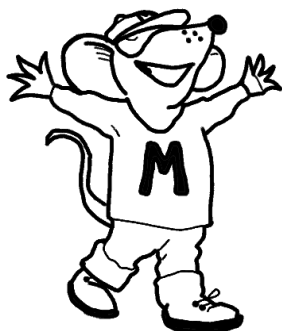
a. 15   b. 25   c. 34   d. 19   e. 23   f. 32   g. 46   h. 64

4. Try multiplying these more difficult numbers by **20** using this idea:

a. 48   b. 27   c. 66   d. 73   e. 98   f. 47   g. 88   h. 75

5. Using these ideas, see how quickly you can work out these little beauties!

a.  $54 \times 20$    b.  $65 \times 5$    c.  $48 \times 5$    d.  $72 \times 20$    e.  $55 \times 20$    f.  $74 \times 5$   
g.  $78 \times 20$    h.  $55 \times 5$



If we want to multiply by **5**,  
we can multiply by **10** and  
then halve the answer.

**Eg.  $36 \times 5 = 360 \div 2 = 180$**

1. Try multiplying these numbers by **5** using this idea:

a. 22   b. 40   c. 32   d. 26   e. 50   f. 34   g. 62   h. 66

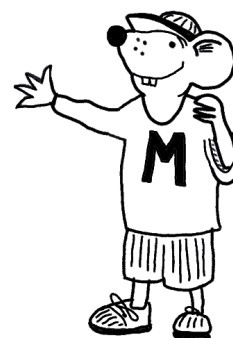
2. Try multiplying these more difficult numbers by **5** using this idea:

a. 76   b. 45   c. 35   d. 38   e. 17   f. 52   g. 25   h. 84

We can do something similar with multiplying  
by **20**.

Multiply by **10** and then double the answer.

**Eg.  $45 \times 20 = 450 \times 2 = 900$**



3. Try multiplying these numbers by **20** using this idea:

a. 10   b. 42   c. 36   d. 22   e. 46   f. 64   g. 44   h. 18

4. Try multiplying these more difficult numbers by **20** using this idea:

a. 38   b. 43   c. 65   d. 27   e. 89   f. 29   g. 67   h. 73

5. Using these ideas, see how quickly you can work out these little beauties!

a.  $32 \times 5$    b.  $84 \times 20$    c.  $42 \times 5$    d.  $56 \times 5$    e.  $24 \times 20$    f.  $78 \times 20$   
g.  $63 \times 5$    h.  $46 \times 20$



1. Write down the **four** times table in the **first** column.



We have helped  
you a little.

A very  
little!!!!!!

$1 \times 4 = 4$	$1 \times 8 =$
$2 \times 4 =$	$2 \times 8 =$
$3 \times 4 =$	$3 \times 8 =$
$4 \times 4 =$	$4 \times 8 =$
$5 \times 4 =$	$5 \times 8 =$
$6 \times 4 =$	$6 \times 8 =$
$7 \times 4 =$	$7 \times 8 =$
$8 \times 4 =$	$8 \times 8 =$
$9 \times 4 =$	$9 \times 8 =$
$10 \times 4 =$	$10 \times 8 =$

Now fill in the second column by doubling.

2. We can use the doubling method to work out big sums.

How far can you go with these patterns?

$$1 \times 12 = 12$$

$$1 \times 16 = 16$$

$$2 \times 12 =$$

$$2 \times 16 =$$

$$4 \times 12 =$$

$$4 \times 16 =$$

$$8 \times 12 =$$

$$8 \times 16 =$$

$$16 \times 12 =$$

$$16 \times 16 =$$

$$32 \times 12 =$$

$$32 \times 16 =$$

$$64 \times 12 =$$

$$64 \times 16 =$$

1. Write down the **six** times table in the **first** column.

**A Maths rat  
with nothing  
to say!**



$1 \times 6 = 6$	$1 \times 12 =$
$2 \times 6 =$	$2 \times 12 =$
$3 \times 6 =$	$3 \times 12 =$
$4 \times 6 =$	$4 \times 12 =$
$5 \times 6 =$	$5 \times 12 =$
$6 \times 6 =$	$6 \times 12 =$
$7 \times 6 =$	$7 \times 12 =$
$8 \times 6 =$	$8 \times 12 =$
$9 \times 6 =$	$9 \times 12 =$
$10 \times 6 =$	$10 \times 12 =$

**That makes  
a change!**

Now fill in the second column by doubling.

2. We can use the doubling method to work out big sums.

How far can you go with these patterns?

$$1 \times 15 = 15$$

$$1 \times 24 = 24$$

$$2 \times 15 =$$

$$2 \times 24 =$$

$$4 \times 15 =$$

$$4 \times 24 =$$

$$8 \times 15 =$$

$$8 \times 24 =$$

$$16 \times 15 =$$

$$16 \times 24 =$$

$$32 \times 15 =$$

$$32 \times 24 =$$

$$64 \times 15 =$$

$$64 \times 24 =$$

1. Look at this table:

$$\begin{array}{l} 1 \times 18 = 18 \\ 2 \times 18 = 36 \\ 4 \times 18 = 72 \\ 8 \times 18 = 144 \\ 16 \times 18 = 288 \end{array}$$

From this we can work out other multiples of **18**.

Watch the next bit carefully.



If we want to work out  $12 \times 18$ , we should notice that **12** is  $8 + 4$ .

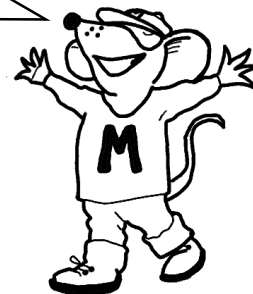
So,  $12 \times 18$  is  $(8 \times 18) + (4 \times 18)$

I told you to watch carefully.

From the table, we can see that:

$$8 \times 18 = 144 \text{ and } 4 \times 18 = 72.$$

$$\text{So } 12 \times 18 = 144 + 72 = 216$$



Now, you try this method with these sums.

The first has been done for you.

- a.  $7 \times 18 = (4 \times 18) + (2 \times 18) + (1 \times 18) = 72 + 36 + 18 = 126$
- b.  $5 \times 18 =$
- c.  $15 \times 18 =$
- d.  $22 \times 18 =$

We can find a quarter of a number by halving and halving again.

Eg. Half of **48** is **24**.

Half of **24** is **12**

So a quarter of **48** is **12**.



1. Use this method to find a quarter of these numbers:

a. 40   b. 32   c. 16   d. 28   e. 48   f. 60   g. 64   h. 100

2. Now use the same method to find a quarter of these harder numbers:

a. 84   b. 600   c. 480   d. 320   e. 96   f. 172   g. 464   h. 328

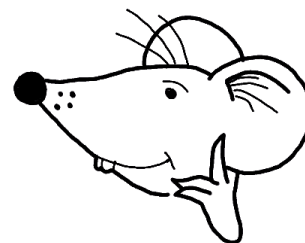
We can find an eighth of a number by halving, halving again and halving again.

Eg. Half of **56** is **28**.

Half of **28** is **14**

Half of **14** is **7**

So an eighth of **56** is **7**.



3. Use this method to find an eighth of these numbers:

a. 64   b. 80   c. 48   d. 72   e. 24   f. 88   g. 96   h. 880

4. Now use the same method to find an eighth of these harder numbers:

a. 176   b. 888   c. 248   d. 488   e. 960   f. 368   g. 312   h. 264

## Answers

### **Page 3**

1. a. 46 b. 68 c. 26 d. 48 e. 88 f. 84 g. 42 h. 64  
 2. a. 92 b. 114 c. 76 d. 104 e. 150 f. 78 g. 56 h. 72  
 3. a. 14 b. 24 c. 13 d. 34 e. 42 f. 41 g. 31 h. 43  
 4. a. 29 b. 37 c. 19 d. 26 e. 48 f. 29 g. 38 h. 46  
 5. a. 66 b. 98 c. 13 d. 74 e. 49 f. 27 g. 70 h. 34

### **Page 4**

1. a. 70 b. 48 c. 62 d. 84 e. 86 f. 50 g. 28 h. 88  
 2. a. 112 b. 56 c. 78 d. 94 e. 154 f. 96 g. 74 h. 52  
 3. a. 12 b. 31 c. 22 d. 41 e. 44 f. 30 g. 43 h. 34  
 4. a. 18 b. 28 c. 36 d. 17 e. 39 f. 46 g. 47 h. 28  
 5. a. 90 b. 114 c. 19 d. 92 e. 34 f. 18 g. 94 h. 58

### **Page 5**

1. a. 96 b. 208 c. 68 d. 112 e. 168 f. 140 g. 88 h. 72  
 2. a. 220 b. 156 c. 104 d. 136 e. 252 f. 108 g. 184 h. 132  
 3.  
 $23 > 46 > 92$   
 $56 > 112 > 224$   
 $37 > 74 > 148$   
 $65 > 130 > 260$   
 $39 > 78 > 156$

### **Page 6**

1. a. 128 b. 88 c. 124 d. 172 e. 104 f. 72 g. 76 h. 96  
 2. a. 256 b. 288 c. 152 d. 108 e. 68 f. 180 g. 148 h. 100  
 3.  
 $41 > 82 > 164$   
 $63 > 126 > 252$   
 $52 > 104 > 208$   
 $73 > 146 > 292$   
 $34 > 68 > 136$

### **Page 7**

1. a. 130 b. 160 c. 90 d. 80 e. 220 f. 140 g. 210 h. 320  
 2. a. 270 b. 195 c. 125 d. 280 e. 325 f. 145 g. 240 h. 235  
 3. a. 300 b. 500 c. 680 d. 380 e. 460 f. 640 g. 920 h. 1 280  
 4. a. 960 b. 540 c. 1 320 d. 1 460 e. 1 960 f. 940 g. 1 760 h. 1 500  
 5. a. 1 080 b. 325 c. 240 d. 1 440 e. 1 100 f. 370 g. 1 560 h. 275

## Answers (Contd)

### Page 8

1. a. 110 b. 200 c. 160 d. 130 e. 250 f. 170 g. 310 h. 330  
 2. a. 380 b. 225 c. 175 d. 190 e. 85 f. 260 g. 125 h. 420  
 3. a. 200 b. 840 c. 720 d. 440 e. 920 f. 1 280 g. 880 h. 360  
 4. a. 760 b. 860 c. 1 300 d. 540 e. 1 780 f. 580 g. 1 340 h. 1 460  
 5. a. 160 b. 1 680 c. 210 d. 280 e. 480 f. 1 560 g. 315 h. 920

### Page 9

1.

$1 \times 4 = 4$	$1 \times 8 = 8$	$1 \times 12 = 12$	$1 \times 16 = 16$
$2 \times 4 = 8$	$2 \times 8 = 16$	$2 \times 12 = 24$	$2 \times 16 = 32$
$3 \times 4 = 12$	$3 \times 8 = 24$	$4 \times 12 = 48$	$4 \times 16 = 64$
$4 \times 4 = 16$	$4 \times 8 = 32$	$8 \times 12 = 96$	$8 \times 16 = 128$
$5 \times 4 = 20$	$5 \times 8 = 40$	$16 \times 12 = 192$	$16 \times 16 = 256$
$6 \times 4 = 24$	$6 \times 8 = 48$	$32 \times 12 = 384$	$32 \times 16 = 512$
$7 \times 4 = 28$	$7 \times 8 = 56$	$64 \times 12 = 768$	$64 \times 16 = 1\,024$
$8 \times 4 = 32$	$8 \times 8 = 64$	etc	
$9 \times 4 = 36$	$9 \times 8 = 72$		
$10 \times 4 = 40$	$10 \times 8 = 80$		

### Page 10

1.

$1 \times 6 = 6$	$1 \times 12 = 12$	$1 \times 15 = 15$	$1 \times 24 = 24$
$2 \times 6 = 12$	$2 \times 12 = 24$	$2 \times 15 = 30$	$2 \times 24 = 48$
$3 \times 6 = 18$	$3 \times 12 = 36$	$4 \times 15 = 60$	$4 \times 24 = 96$
$4 \times 6 = 24$	$4 \times 12 = 48$	$8 \times 15 = 120$	$8 \times 24 = 192$
$5 \times 6 = 30$	$5 \times 12 = 60$	$16 \times 15 = 240$	$16 \times 24 = 384$
$6 \times 6 = 36$	$6 \times 12 = 72$	$32 \times 15 = 480$	$32 \times 24 = 768$
$7 \times 6 = 42$	$7 \times 12 = 84$	$64 \times 15 = 960$	$64 \times 24 = 1\,536$
$8 \times 6 = 48$	$8 \times 12 = 96$	etc	
$9 \times 6 = 54$	$9 \times 12 = 108$		
$10 \times 6 = 60$	$10 \times 12 = 120$		

### Page 11

- a. 126 b. 90 c. 270 d. 396

This idea is really quite difficult. Don't panic if children find this rather confusing!

### Page 12

1. a. 10 b. 8 c. 4 d. 7 e. 12 f. 15 g. 16 h. 25  
 2. a. 21 b. 150 c. 120 d. 80 e. 24 f. 43 g. 116 h. 82  
 3. a. 8 b. 10 c. 6 d. 9 e. 3 f. 11 g. 12 h. 110  
 4. a. 22 b. 111 c. 31 d. 61 e. 120 f. 46 g. 39 h. 33