

Name: _____

Crossword

WORKSHEET



CLUES: Across

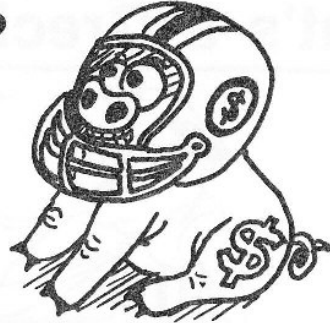
2. 25^2
3. 11^3
6. $2^4 \times 3 \times 7$
7. 3^5
9. $5^2 \times 2$
10. 11^2
12. 4^3
14. $2^3 \times 4$
16. $2^3 \times 3 \times 7$
18. $3^2 \times 10^2$
19. $3^2 \times 4^3$
21. 10×11^2
24. 20^2
25. 6^4
26. 3^3
27. 7^2
29. 9^4
30. $11^2 \times \sqrt{121}$

1		2			3		4	5
6			7		8		9	
		10	11		12	13		
14	15		16		17	18		
	19	20						
			21		22			23
24								
			25				26	
27	28							
	29				30			

CLUES: Down

1. 7^3
2. 3^8
4. $5^2 \times 13$
5. 10^4
7. 6^3
8. 6^2
11. $2^3 \times 3^3$
13. $10^2 \times 7^2$
15. 5^2
17. $\sqrt{36} \times 137$
20. $5^3 \times 3 \times 2$
21. $2^2 \times 3 \times 11$
22. 11^4
23. $\sqrt{49} \times 11^2$
24. $11^2 \times 2^2$
25. $3^2 \times 7 \times \sqrt[3]{8}$
26. 3^5
28. $2^5 \times \sqrt{9}$

What did the girl say when she opened her piggy bank?



Find the value of the squares and cubes below. Shade in the boxes containing these values. The letters in the remaining boxes will spell out the answer to the question.

26^2 = _____	7^3 = _____	19^2 = _____	13^3 = _____	25^2 = _____
19^3 = _____	18^2 = _____	29^2 = _____	14^2 = _____	5^3 = _____
32^2 = _____	10^3 = _____	17^2 = _____	12^2 = _____	6^3 = _____
12^3 = _____	21^2 = _____	15^2 = _____	8^3 = _____	24^2 = _____
20^2 = _____	3^3 = _____	31^2 = _____	22^2 = _____	28^2 = _____

H 125	O 529	W 216	D 289	I 343	D 841	T 1728	H 961	I 1331	S 625		
M 576	U 324	C 256	H 512	C 1000	U 900	R 64	R 6859	E 484	N 441	C 676	Y 225
G 1024	E 361	T 400	I 2197	N 27	M 121	Y 144	T 729	I 784	N 196		

Happy numbers

What is a *happy* number? Is there a *sad* number? To find out, we "zap" the digits! To zap, find the sum of the squares of the number. Repeat, if necessary, until a *single digit* is formed. For some numbers, this is a *long* task!

Examples



$$\begin{aligned} 1. \quad 12 &\text{ Z } 1^2 + 2^2 \\ &= 1 + 4 \\ &= 5 \end{aligned}$$

$$\begin{aligned} 2. \quad 31 &\text{ Z } 3^2 + 1^2 \\ &= 9 + 1 \\ &= 10 \end{aligned}$$

$$\begin{aligned} 10 &\text{ Z } 1^2 + 0^2 \\ &= 1 + 0 \\ &= 1 \end{aligned}$$



$$\therefore 31 \text{ Z } 10 \text{ Z } 1$$

31 is a happy number, as it zaps to 1.

Check that:

$$\begin{aligned} 7 &\text{ Z } 97 \text{ Z } 130 \text{ Z } 10 \text{ Z } 1 \\ 13 &\text{ Z } 10 \text{ Z } 1 \end{aligned}$$

$$\begin{aligned} 19 &\text{ Z } 82 \text{ Z } 68 \text{ Z } 100 \text{ Z } 1 \\ 32 &\text{ Z } 13 \text{ Z } 10 \text{ Z } 1 \end{aligned}$$

Are these happy?

86 129 912 1300

Investigate:

- cycles of numbers that repeat over and over
- a key number (between 80 and 90) that occurs often
- any short cuts to work out if a number is happy or not
- that the numbers 10, 11, 13, 19, 23, 28, 31, 32, 44 and 49 are the only happy numbers less than 50
- that if 28 is happy, 82 is also happy, and why
- the smallest digit that 37 zaps to give

Table of numbers between 1 and 200

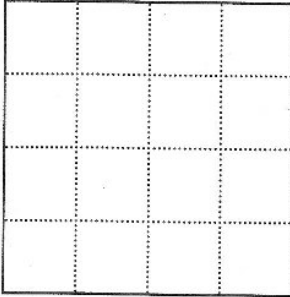
Circle the happy numbers in red.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
196	197	198	199	200										

2.6 Square roots

Joshua wants to draw a square with an area of 16 cm^2 .

What is the length of each side of this square?



This square is drawn on 1 cm grid paper.

The length of each side is 4 cm.

$$4^2 = 4 \times 4 = 16$$

To find the length of each side, find the **square root** of 16.

$$\text{We write: } \sqrt{16} = 4$$

Finding the square root is the **inverse** of squaring a number.

1 Complete these statements.

a $2^2 = 2 \times 2 = 4$

so $\sqrt{4} = 2$

b $3^2 = 3 \times 3 = 9$

so $\sqrt{9} = \underline{\hspace{2cm}}$

c $4^2 = 4 \times 4 = \underline{\hspace{2cm}}$

so $\sqrt{16} = \underline{\hspace{2cm}}$

d $5^2 = 5 \times 5 = \underline{\hspace{2cm}}$

so $\sqrt{\hspace{2cm}} = 5$

e $6^2 = 6 \times 6 = \underline{\hspace{2cm}}$

so $\sqrt{\hspace{2cm}} = 6$

f $9^2 = 9 \times 9 = \underline{\hspace{2cm}}$

so $\sqrt{\hspace{2cm}} = 9$

g $12^2 = 12 \times 12 = \underline{\hspace{2cm}}$

so $\sqrt{\hspace{2cm}} = 12$



2 Find the values of these square roots.

a $\sqrt{25} = \underline{\hspace{2cm}}$

b $\sqrt{36} = \underline{\hspace{2cm}}$

c $\sqrt{49} = \underline{\hspace{2cm}}$

d $\sqrt{64} = \underline{\hspace{2cm}}$

e $\sqrt{100} = \underline{\hspace{2cm}}$

f $\sqrt{169} = \underline{\hspace{2cm}}$

g $\sqrt{225} = \underline{\hspace{2cm}}$

h $\sqrt{256} = \underline{\hspace{2cm}}$

i $\sqrt{400} = \underline{\hspace{2cm}}$



3 Use your calculator to find the values of these square roots.

Round each answer to 1 decimal place.

a $\sqrt{15} = \underline{\hspace{2cm}}$

b $\sqrt{20} = \underline{\hspace{2cm}}$

c $\sqrt{26} = \underline{\hspace{2cm}}$

d $\sqrt{30} = \underline{\hspace{2cm}}$

e $\sqrt{42} = \underline{\hspace{2cm}}$

f $\sqrt{70} = \underline{\hspace{2cm}}$

g $\sqrt{125} = \underline{\hspace{2cm}}$

h $\sqrt{150} = \underline{\hspace{2cm}}$

i $\sqrt{200} = \underline{\hspace{2cm}}$

2.5 Square numbers

Square numbers can be represented by a pattern of dots. They are arranged with the same number of dots in each row and each column.



The diagrams above show the first five square numbers.

$$1 = 1 \times 1 = 1^2 \quad (\text{Called one squared})$$

$$4 = 2 \times 2 = 2^2 \quad (\text{Called two squared})$$

$$9 = 3 \times 3 = 3^2 \quad (\text{Called three squared})$$

$$16 = 4 \times 4 = 4^2 \quad (\text{Called four squared})$$

$$25 = 5 \times 5 = 5^2 \quad (\text{Called five squared})$$

The next number in this pattern would be $6^2 = 6 \times 6 = 36$.



- 1 Draw a dot diagram in the pattern above to represent 36.
- 2 What is the next square number? _____

Rule: To square a number is to multiply it by itself.

For example: $8^2 = 8 \times 8 = 64$

- 3 Write the values of the first ten square numbers.

--	--	--	--	--	--	--	--	--	--

- 4 What is the 15th square number? _____

- 5 Find the value of the following square numbers.

a $8^2 =$ _____

b $10^2 =$ _____

c $9^2 =$ _____

d $12^2 =$ _____

e $14^2 =$ _____

f $16^2 =$ _____

g $18^2 =$ _____

h $20^2 =$ _____

i $25^2 =$ _____

j $22^2 =$ _____

k $24^2 =$ _____

l $27^2 =$ _____

m $30^2 =$ _____

n $50^2 =$ _____

o $100^2 =$ _____

Squares and square roots

N9

- Use a ruler to draw lines to join the dot next to each question to its answer on the right.
- Each line passes through a letter and a number.

In 1922 Howard Carter found:

Unlock the code.

Math problems on the left:

- 2^2
- $\sqrt{25}$
- 7^2
- 3^2
- $\sqrt{100}$
- $\sqrt{144}$
- 10^2
- 9^2
- $\sqrt{81}$
- $\sqrt{16}$
- 4^2
- 5^2

Math problems on the right:

- 5
- 12
- 49
- 81
- 4
- 9
- 100
- 25
- 16
- 10

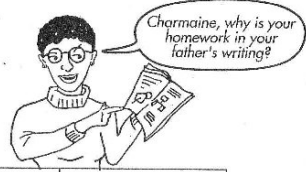
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.








TOMB

N8

Money problems



Find the answers to the following problems to unlock the code.

| | | |
|---|---|---|
| The cost of 5 apples if 7 apples cost \$2.80
 | 3 bottles of cola at \$2.05 per bottle
 | If 9 ribbons can be bought for \$1.80 what is each ribbon worth?
 |
| B | S | U |
| A dozen pens cost \$8.40. How much are 5 pens worth? | Find the cost of 9 bags of sherbet at 57 cents per bag. | Cakes costing \$12 are cut into 24 pieces. How much should be charged per piece? |
| H | O | C |
| 2 kg of potatoes cost \$7. What is the cost of 3 kg? | 6 bottles of cider at \$1.50 each | Two dozen lollies at \$1.40 per dozen. |
| P | E | R |
| 2 packets of biscuits cost \$4.90. Find the cost of 9 packets. | If one pie costs \$1.30, find the change given from \$5 if 2 pies are purchased. | 3 books cost \$33. Find the cost of 7 books.
 |
| A | W | I |
| 3 cans of soft drink cost \$3.60. Find the cost of a dozen cans of soft drink. | 2 jars of sundried tomatoes cost \$10.10. Find the cost of 3 jars. | Find the cost of a 3 litre tub of gelato at \$4.75 per litre.
 |
| M | N | D |

\$2 \$9 50c \$22.05 20c \$6.15 \$9 \$77 \$2 \$8.13 \$2.80 \$2.80 \$5.13 \$2.40 \$9 \$14.25
\$3.50 \$77 \$6.15 \$10.50 \$9 \$15.15 \$14.40 \$77 \$6.15 \$6.15