



Developing the Essential Strategies for Computational Fluency

PROFESSIONAL DEVELOPMENT
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DENVER ISD

James Burnett, M.Ed.

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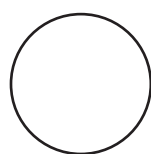
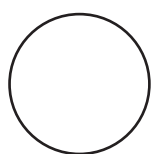
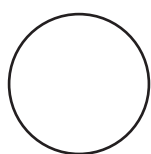
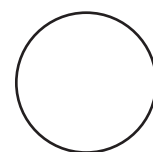
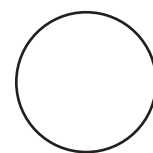
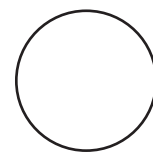
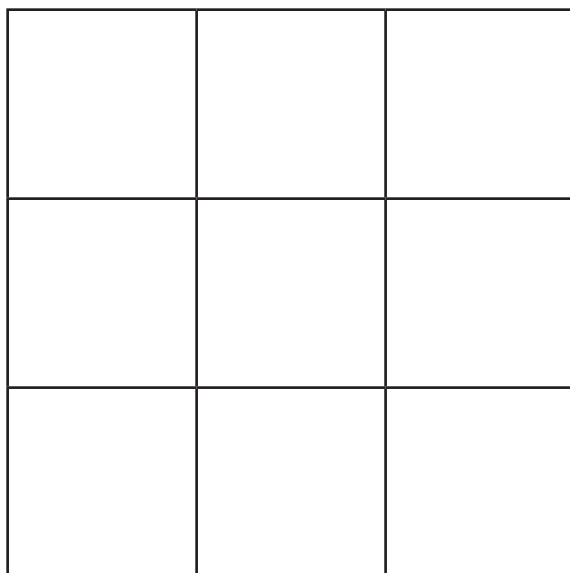
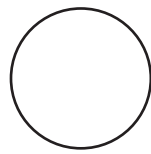
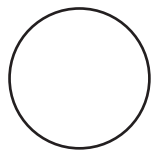
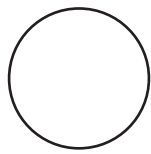
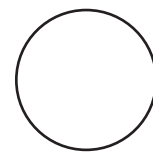
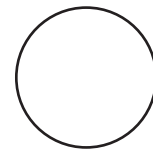
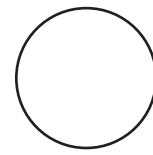
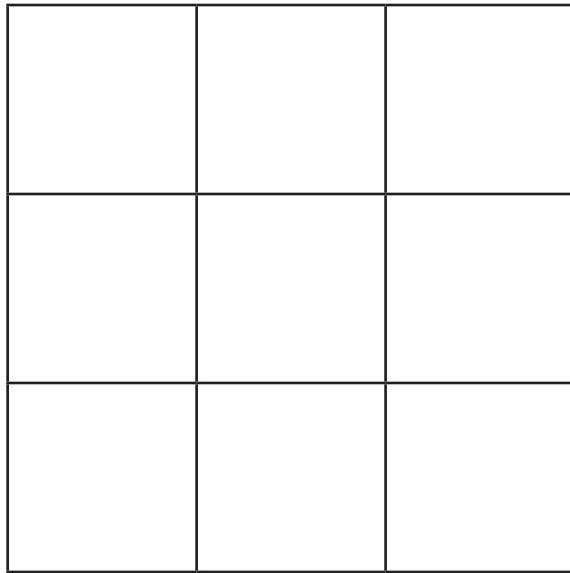


This or That Again?

Round	Player One	Player Two	Player Three
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Materials: 3 standard dice

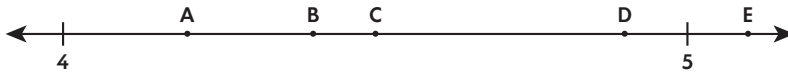
16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1



Use multiple models for number – relative position

17

Look at this number line.



What numbers could be **located** at points A, B, C, D, and E?

Computation and Number Sense

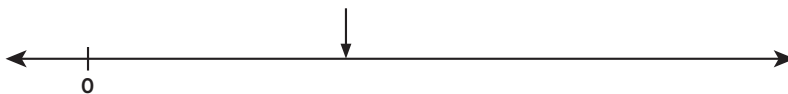
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Green Tank



1

Trace this number line onto another sheet of paper.



If the arrow is pointing to **50**, mark where you think these numbers are **located**.

- a. 65
- b. 100
- c. 10
- d. 45
- e. 110

Computation and Number Sense

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Use multiple models for number – place value

18

Look at these digits.

2 7 3 5

Use each digit only once. Write

- the **greatest** (biggest) odd number possible.
- the **least** (smallest) even number possible.
- two numbers that are **close to 5,300**.
- two numbers that have a **difference of 9**.

Computation and Number Sense

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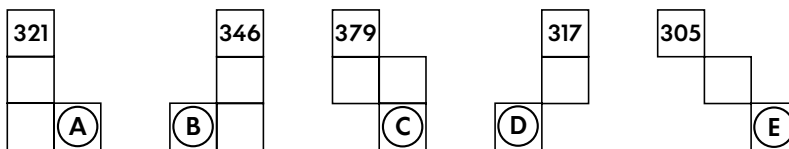


2

Here is a **chunk** of a hundred chart.

301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320

Here are some **pieces** of the same chart.



Write the numbers that belong at A, B, C, D, and E.

Computation and Number Sense

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Take or Tally

Player 1

Player 2

$13 - \underline{\quad} = \underline{\quad}$

$13 - \underline{\quad} = \underline{\quad}$

$12 - \underline{\quad} = \underline{\quad}$

$12 - \underline{\quad} = \underline{\quad}$

$11 - \underline{\quad} = \underline{\quad}$

$11 - \underline{\quad} = \underline{\quad}$

$10 - \underline{\quad} = \underline{\quad}$

$10 - \underline{\quad} = \underline{\quad}$

$9 - \underline{\quad} = \underline{\quad}$

$9 - \underline{\quad} = \underline{\quad}$

$8 - \underline{\quad} = \underline{\quad}$

$8 - \underline{\quad} = \underline{\quad}$

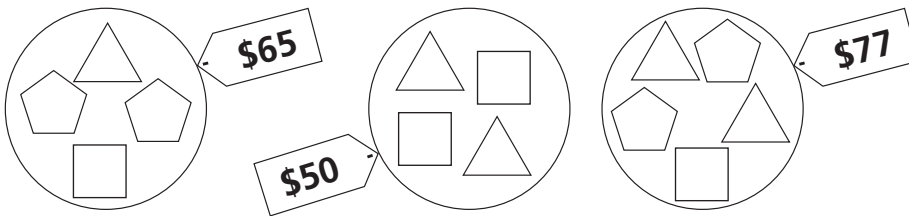
Tally

Tally




Cube A: 1, 2, 3, 1, 2, 3

Cube B: 7, 8, 9, 10, 11, 12

11

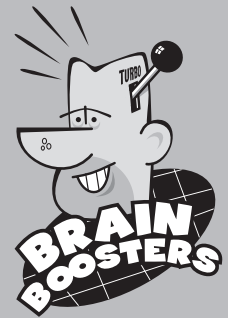


Same shapes cost the same amount.

- a.  \$ _____
- b.  \$ _____
- c.  \$ _____

Thinking Mathematically and Problem Solving

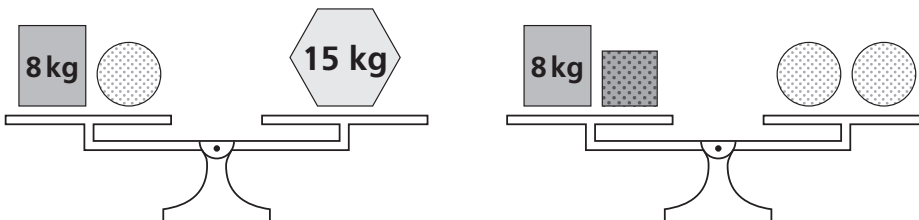
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
Red Tank

18

Same shapes weigh the same.



 = _____ kg

 = _____ kg

Thinking Mathematically and Problem Solving

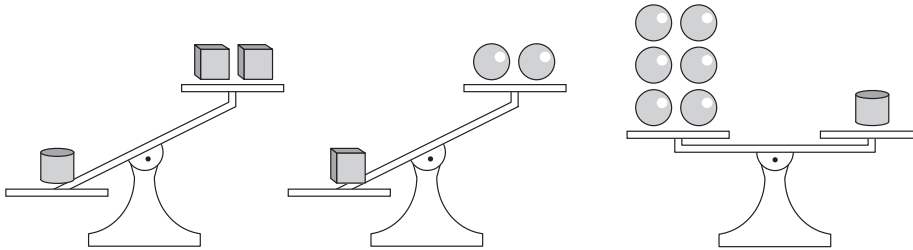
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Yellow Tank


17

Each shape is a whole number of kilograms.



 = 12 kg

a.  = ____ kg

b.  = ____ kg

Thinking Mathematically and Problem Solving

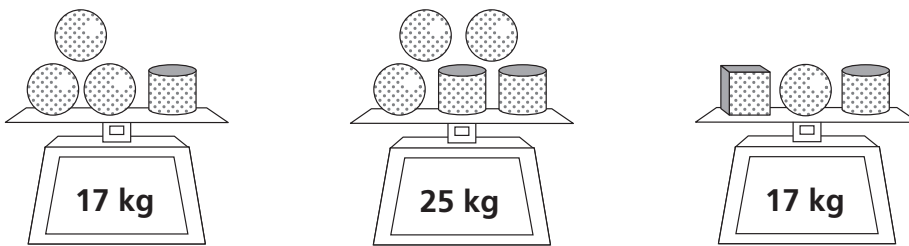
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Prickly Problems


Purple Tank


17



Same shapes are the same number of kilograms.

a.  = ____ kg

b.  = ____ kg

c.  = ____ kg

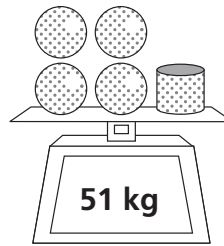
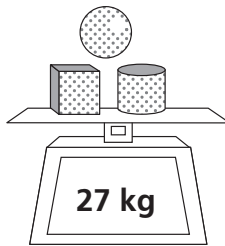
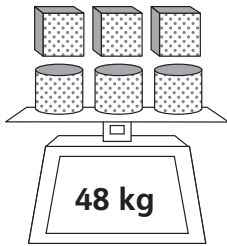
Thinking Mathematically and Problem Solving

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Green Tank

5



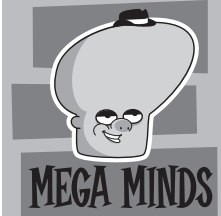
Same shapes are the same number of kilograms.

- a.  = ____ kg
- b.  = ____ kg
- c.  = ____ kg

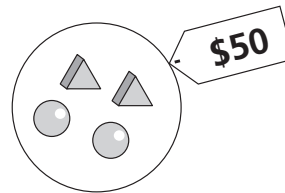
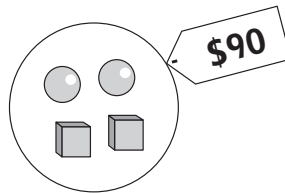
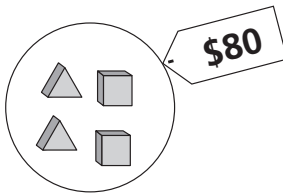
Thinking Mathematically and Problem Solving

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Red Tank



17



Same shapes are the same price.

- a.  \$ _____
- b.  \$ _____
- c.  \$ _____

Thinking Mathematically and Problem Solving

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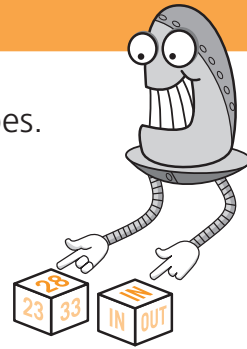
Blue Tank



Writing Input and Output Numbers

Write these numbers and words on the faces of two cubes.

Cube 1 –	23	28	33	37	44	56
Cube 2 –	IN	IN	IN	OUT	OUT	OUT



If you rolled this, you would write 28 in the top row.

Roll both cubes. Write the number from the roll of Cube 1 in the row that matches the roll of Cube 2. Then use the rule to figure out and write the number that should be in the other row.

a.

+15	IN						
	OUT						

b.

-12	IN						
	OUT						

c.

+19	IN						
	OUT						

d.

-21	IN						
	OUT						



Draw another set of IN and OUT rows and write a new rule. Play the game again.

Number Fact Strategies

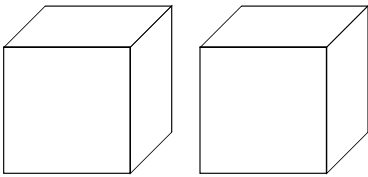
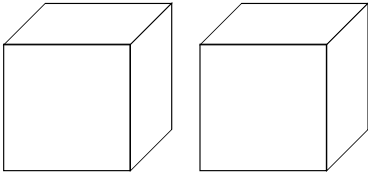
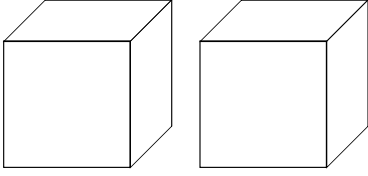
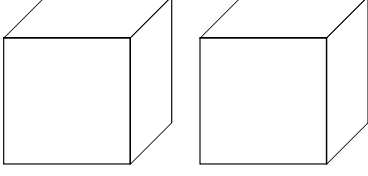
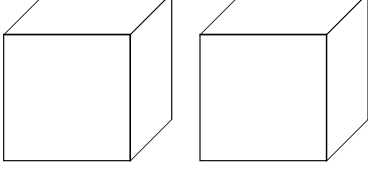
Addition

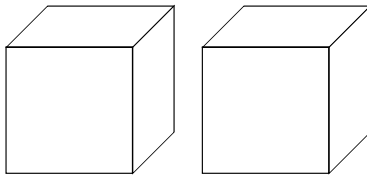
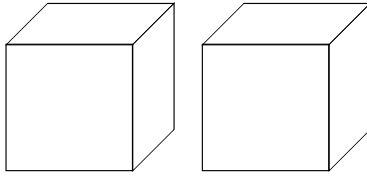
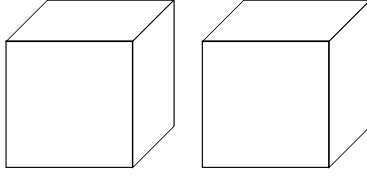
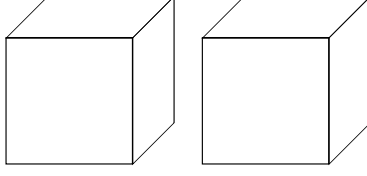
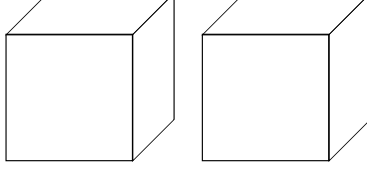
- Count-on 1, 2 and 0
- Doubles and near doubles
- Bridge to ten







Multiplication

- Use tens (5s)
- Make generalizations (1s and 0s)
- Use doubles (2s, 4s and 8s)
- Build up/down (9s and 6s)

Reinforce: Count on

 ___ + ___ = 11
 ___ + ___ = 5
 ___ + ___ = 9
 ___ + ___ = 8
 ___ + ___ = 7

 ___ + ___ = 6
 ___ + ___ = 8
 ___ + ___ = 7
 ___ + ___ = 6
 ___ + ___ = 10

Cube A: 4, 5, 6, 7, 8, 9
Cube B: , , , , , 

Addition Chart

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Reinforce: Double add 1

11	19	13	15
13	9	17	19
17	11	15	9

Cube: 4, 5, 6, 7, 8, 9

Reinforce: Bridge to 10

$10 + 6 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 6 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 2 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 2 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$
$10 + 1 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$	$10 + 1 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$

Cube A: 8, 8, 8, 9, 9, 9
Cube B: 3, 4, 5, 5, 6, 7

High or Low

Lana	Skye	Lance
50	50	50
68	50	50
68	50	50
58	40	50

50								





sample

Round	Players	Aim	Kept Numbers	Second Roll	Total
1	Lana	High	6	4	18
	skye	High	5	2	15
	Lance	Low	2	3	10

Round	Players	Aim	Kept Numbers	Second Roll	Total
1					
2					
3					

Materials: 4 standard dice

Cat and Mice

5		1		5		1
4	3	2	3	4	3	2
2	1	3	1	2	1	3
1	4	2	5	3	4	1
2	1	3	1	2	1	3
4	1	2	3	4	1	4
2	3	1		5	3	2
1 HOME	4 HOME	2 HOME	3 HOME	2 HOME	4 HOME	1 HOME

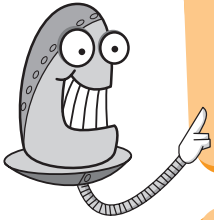
Materials: 2 standard dice

Using Tens to Multiply by 5

Write the answer to the tens number fact.

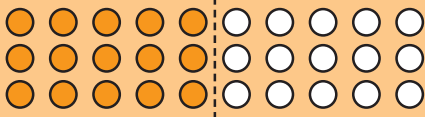
Color half the picture and then write a number fact to match what you colored.

The first one has been colored for you!



a.

$$3 \times 10 = \underline{\quad}$$



$$3 \times 5 = \underline{\quad}$$

b.

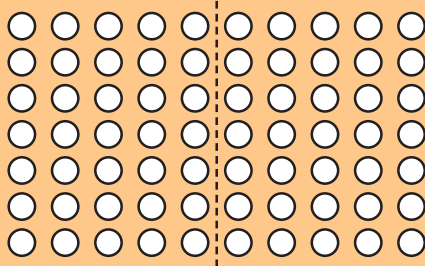
$$2 \times 10 = \underline{\quad}$$



$$2 \times 5 = \underline{\quad}$$

c.

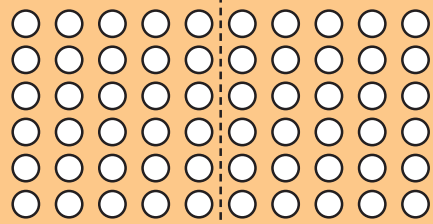
$$7 \times 10 = \underline{\quad}$$



$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$

d.

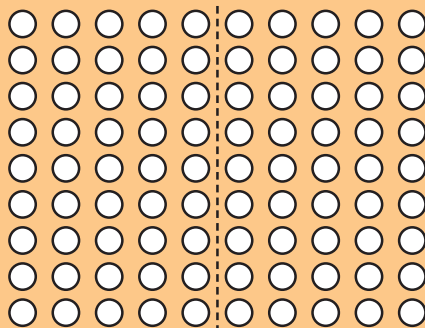
$$6 \times 10 = \underline{\quad}$$



$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$

e.

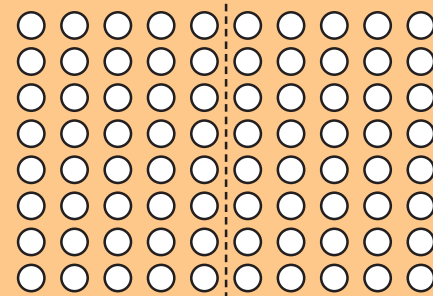
$$9 \times 10 = \underline{\quad}$$



$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$

f.

$$8 \times 10 = \underline{\quad}$$



$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$



Write a tens fact you could use to work out each of these:

a. $4 \times 5 = \underline{\quad}$ b. $12 \times 5 = \underline{\quad}$ c. $16 \times 5 = \underline{\quad}$

Times Tussle

20	50	25	50	10	30
70	30	10	90	45	80
35	40	25	40	15	45
80	15	50	100	90	35
45	25	20	40	50	100
45	25	30	20	30	15
70	60	35	60	20	40

Multiplication Chart

X	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Nice and Easy

30×3	50×3	70×3	90×3
30×4	50×4	70×4	90×4
30×6	50×6	70×6	90×6
30×7	50×7	70×7	90×7
30×8	50×8	70×8	90×8
30×9	50×9	70×9	90×9

Cube A: 15, 15, 25, 35, 45, 45
Cube B: 6, 8, 12, 14, 16, 18

Nice and Easy Too!

90	150	210	270
120	200	280	360
180	300	420	540
210	350	490	630
240	400	560	720
270	450	630	810

Do the Ds

