

GATE



ALL BRANCHES

GENERAL APTITUDE

Analytical Aptitude



Lecture No: 05

By-Amulya Ratan Sir





TOPICS TO BE COVERED



Understanding Concept of Cube



Cutting and formation of Cubes



Dice and it's properties



Questionnaire



Q.

Five persons P, Q, R, S and T belongs to five different cities Jabalpur, Bhopal, Hyderabad, Raipur and Delhi. They are invited to deliver a seminar on different subject Viz., Chemistry, Physics, Mathematics, History and Economics but not necessarily in the same order.

P who belongs to Bhopal gives seminar on Economics.

The person who gives seminar on Physics belongs to Jabalpur.

T does not give seminar on Chemistry or History but belongs to Hyderabad.

S does not belongs to Raipur but gives seminar on Chemistry and History is the option of R.

Assignment



Q1. Who belongs to Raipur?

R ✓

Q2. Physics seminar will be given by?

Q ✓

Q3. T gives seminar on?

Mathematics ✓

Q4. S belongs to which city?

Delhi ✓

Q5. Who belongs to Jabalpur?

Q ✓

- Five persons P, Q, R, S and T belongs to five different cities Jabalpur, Bhopal, Hyderabad, Raipur and Delhi. They are invited to deliver a seminar on different subject Viz., Chemistry, Physics, Mathematics, History and Economics but not necessarily in the same order.
- P who belongs to Bhopal gives seminar on Economics.
- The person who gives seminar on Physics belongs to Jabalpur.
- T does not give seminar on Chemistry or History but belongs to Hyderabad.
- S does not belongs to Raipur but gives seminar on Chemistry and History is the option of R.

	CITY	SUBJECT
P	Bhopal	Eco
Q	Jabalpur	Physics
R	Raipur	History
S	Delhi	Chem
T	Hyderabad	Maths

CITY	JABALPUR	BHOPAL	HYDERABAD	RAIPUR	DELHI
SUBJECT	Chem	Phy	Maths	Hist	Eco



Q. On a shelf are placed six volumes side by side labeled A, B, C, D, E and F. Three volumes B, C and E have green covers while the other volumes have yellow covers. A, D and B are new volumes while the rest are old volumes. A, C and B are law reports, while the rest are Gazetteers.

Which volume is new, yellow covered and a Gazetteer?

- A) E B) D C) C D) A

Which two volumes are old Gazetteers?

- A) E and F B) D and B C) C D) F

Which is green covered, old and a law report volume?

- A) E B) D C) F D) C

Assignment

N — A — Yellow → Low

N — B — Green → Low

→ O — C — Green → Low

N — D — Yellow → Gas

→ O — E — Green → Gas

→ O — F — Yellow → Gas



Q. Prashant Arora has three children – Sangeeta, Vimal and Ashish. Ashish married Monika, the eldest daughter of Mr. and Mrs. Roy. The Roys married their youngest daughter to the eldest son of Mr. and Mrs. Sharma, and they had two children name Amit and Shashi. The Roys have two more children, Roshan and Vandana, both elder to Veena. Sameer and Ajay are sons of Ashish and Monika. Rashmi is the daughter of Amit.

Assignment

Q1. What is the surname of Rashmi?

Sharma

Q2. How is Sameer related to the father of Monika?

Grand Son

Q3. What is the surname of Sameer?

Arora

Mother-in-law

Q4. How is Mrs. Roy related to Ashish?

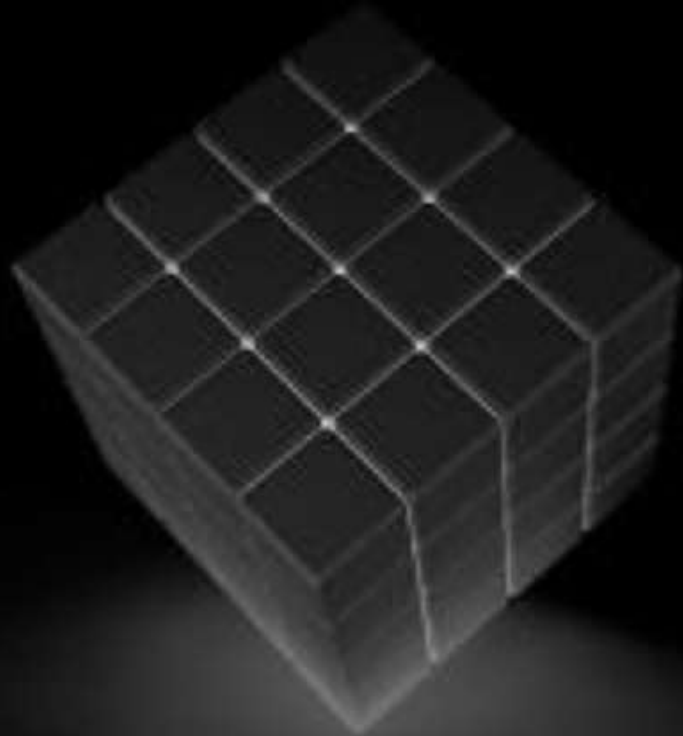
Cubes

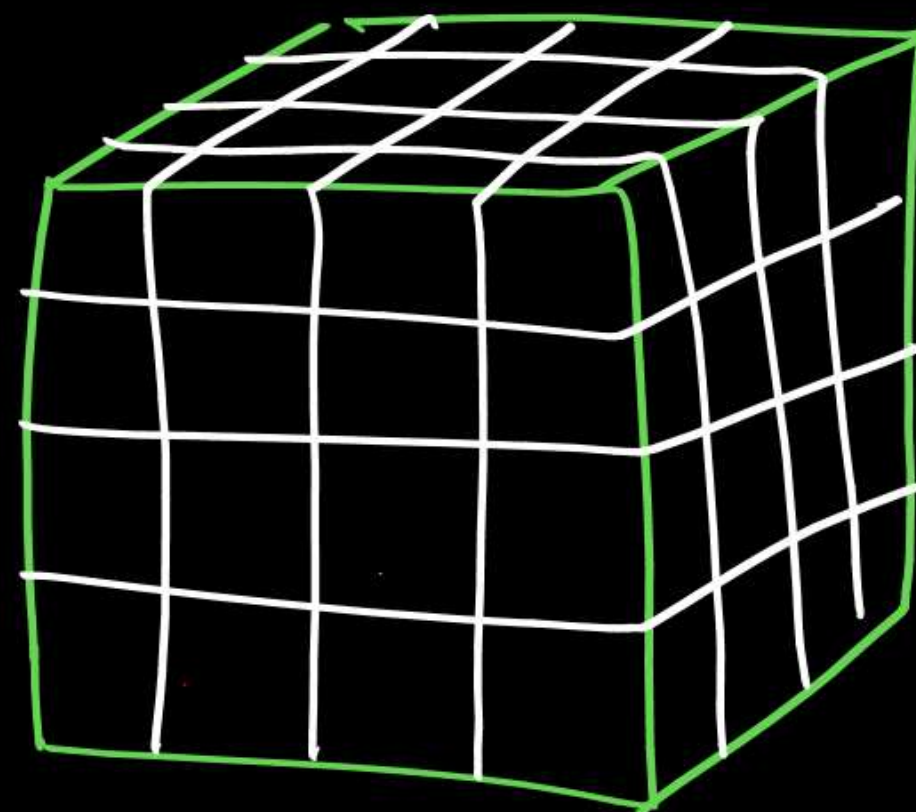
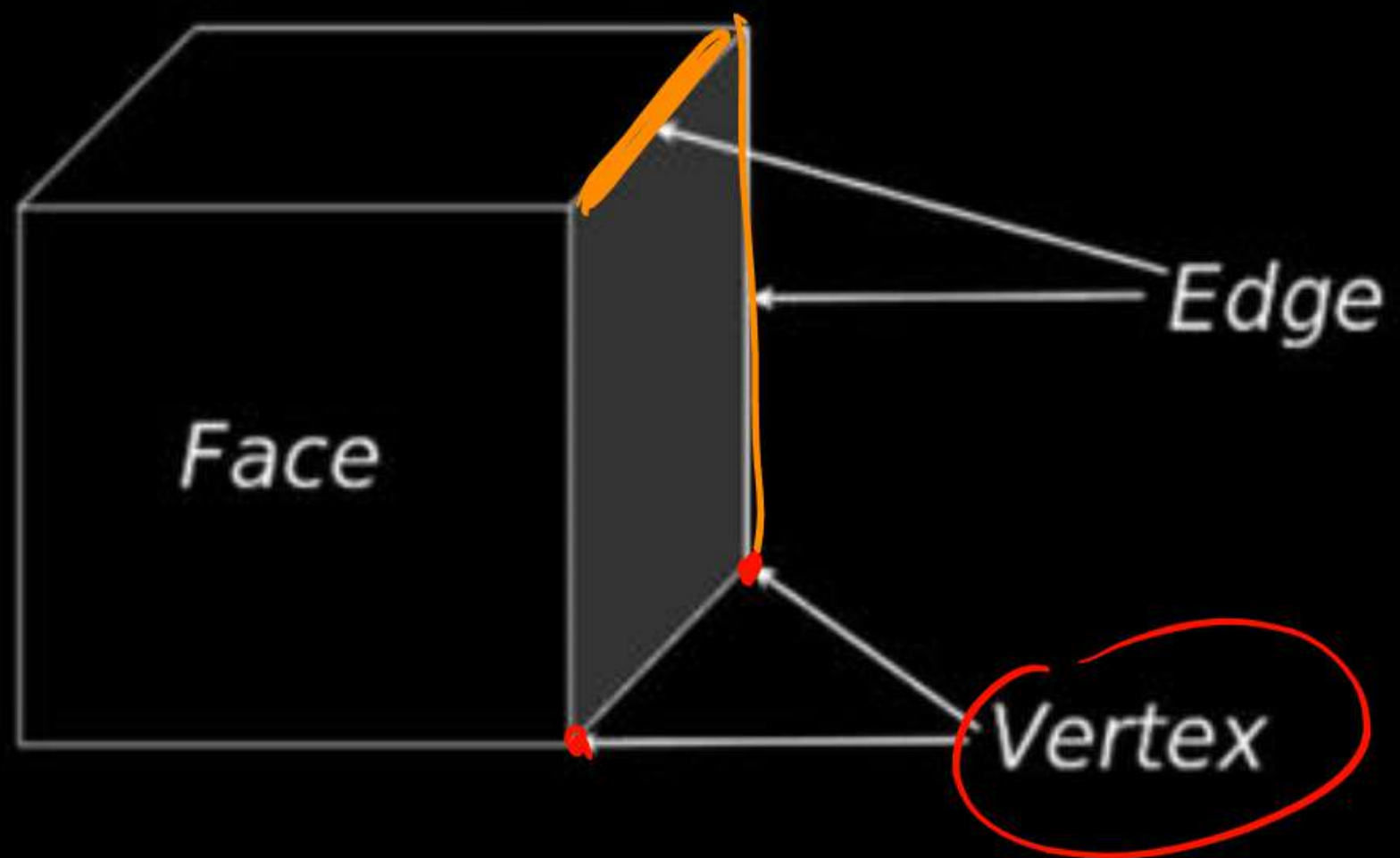


faces $\rightarrow 6$

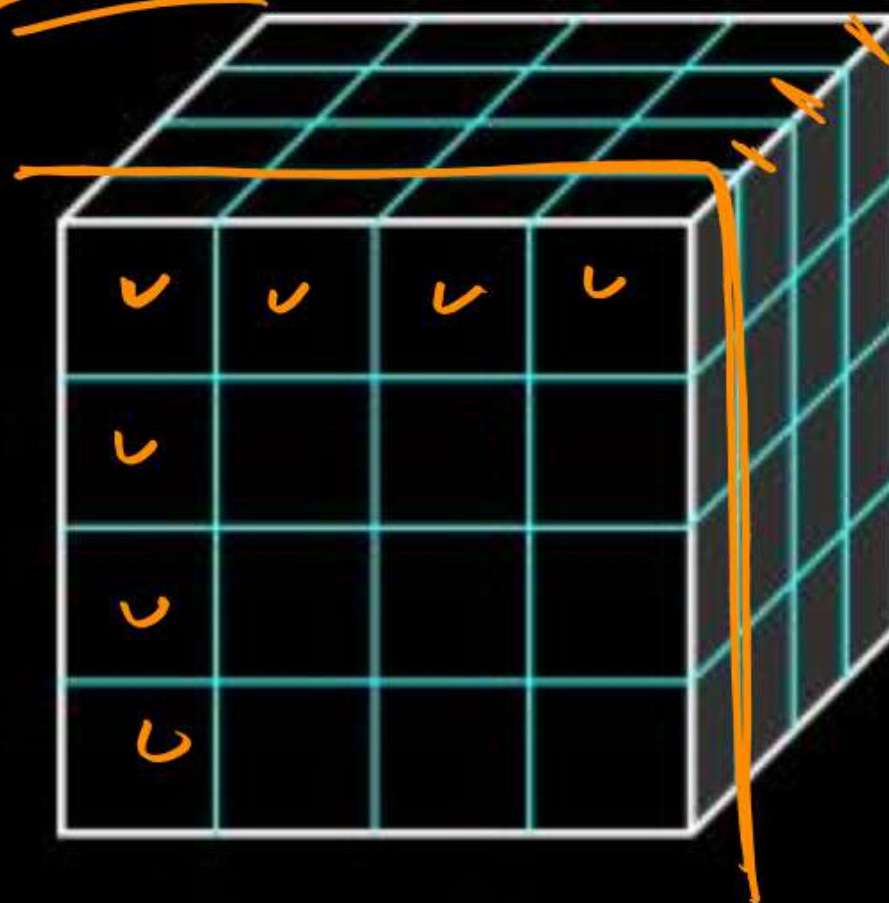
Edges $\rightarrow 12$

Vertex $\rightarrow 8$





$$16 \times 4 = \underline{\underline{64}}$$

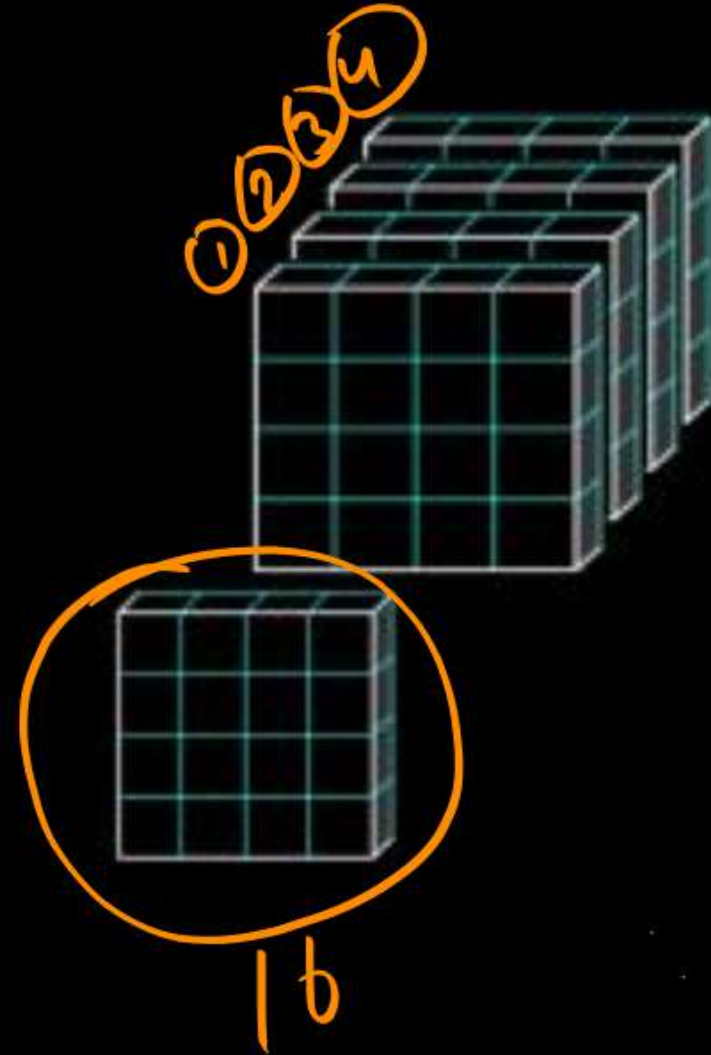
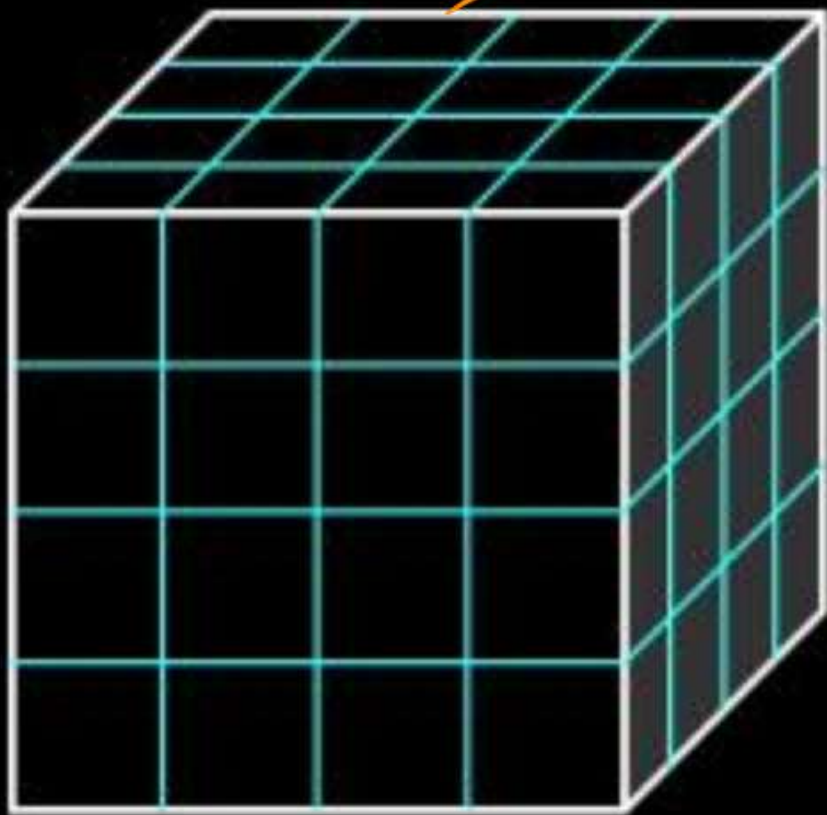


³
'x' cut

No. of cubes
formed
 $= (x+1)^3$

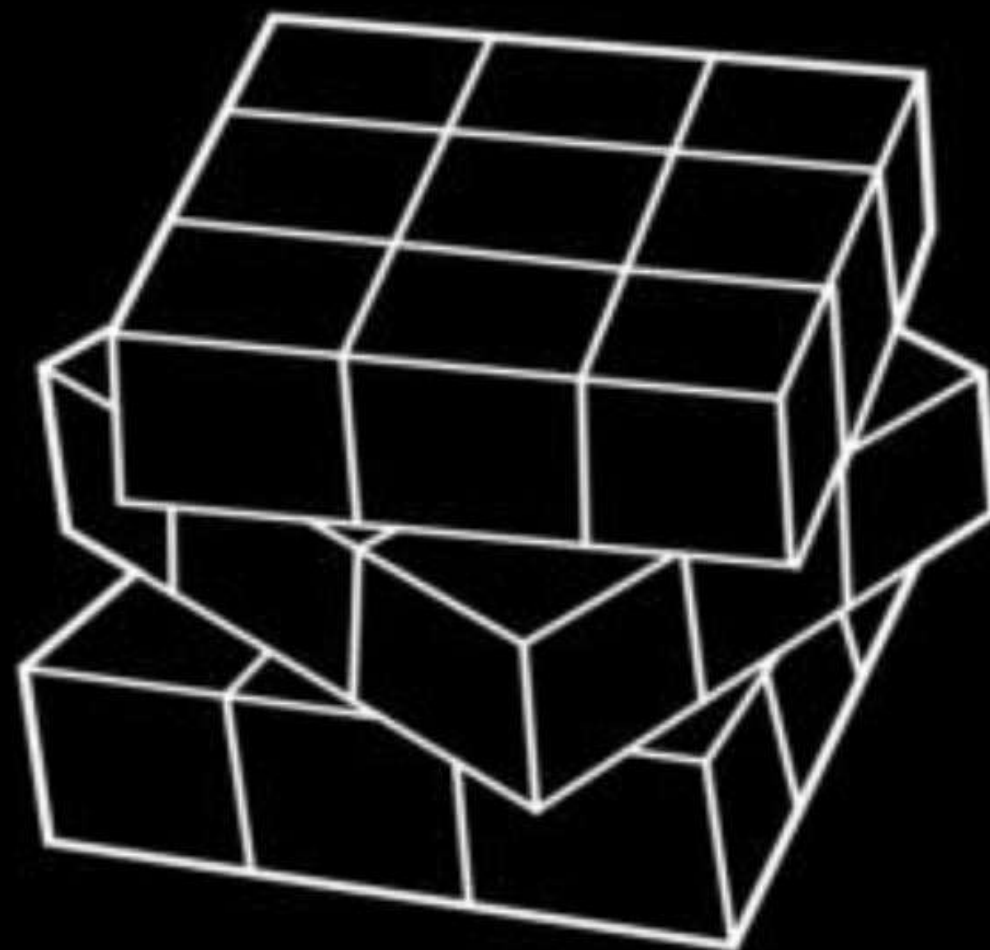
$$= (3+1)^3$$

$$= 4^3 = \underline{\underline{64}}$$



16

observation



6

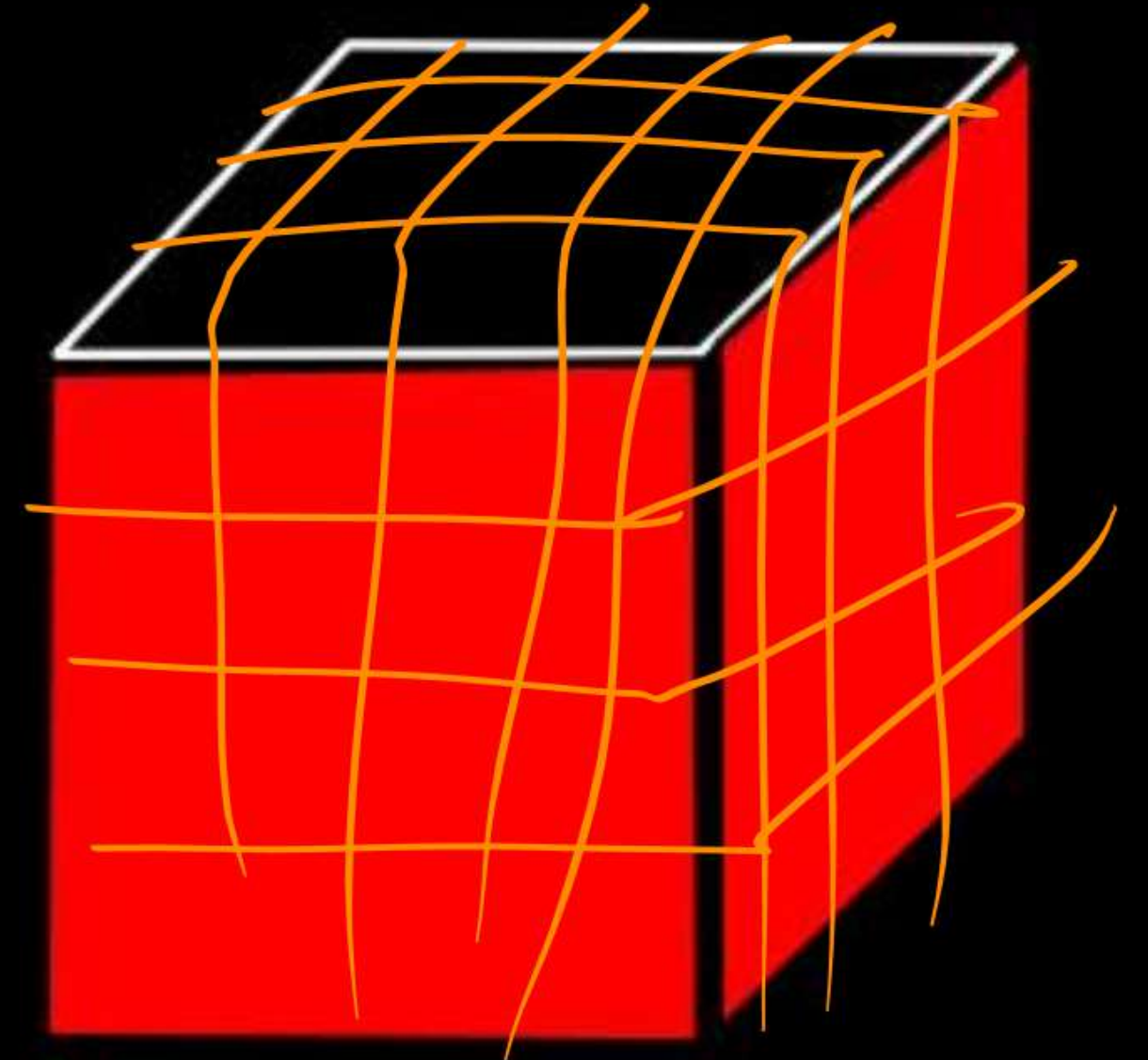


Q. A Cube was painted on one of the opposite pair faces as BLACK & remaining four faces as RED. Four cuts were given on each edges to form smaller Cubes of equal size.

- ① ➤ How many cubes will be formed?
- ② ➤ How many cubes will have no face painted at all?
- ③ ➤ How many cubes will have only one face painted?
- ④ ➤ How many cubes will have only two face painted, but with same colour?
- ⑤ ➤ How many cubes will have only two face painted, but different colour?
- ⑥ ➤ How many cubes will have atleast two face painted?
- ⑦ ➤ How many cubes will have three face painted?

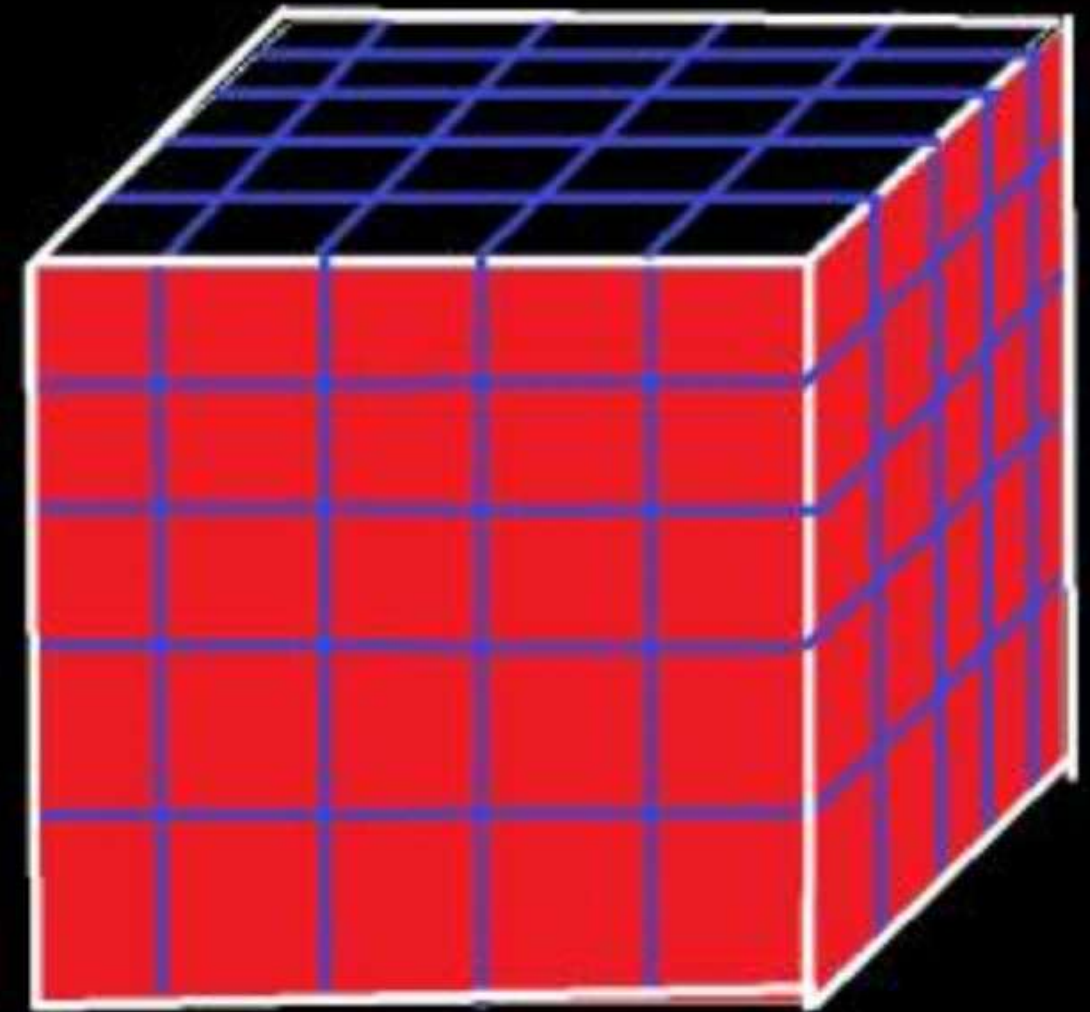
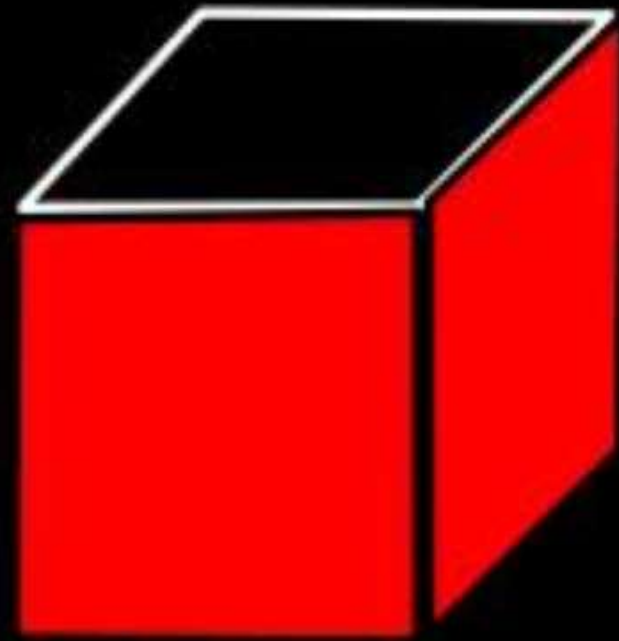


A Cube was painted on one of the opposite pair faces as black & remaining four faces as red. four cuts were given on each edges to form smaller Cubes of equal size.





A Cube was painted on one of the opposite pair faces as black & remaining four faces as red. four cuts were given on each edges to form smaller Cubes of equal size.

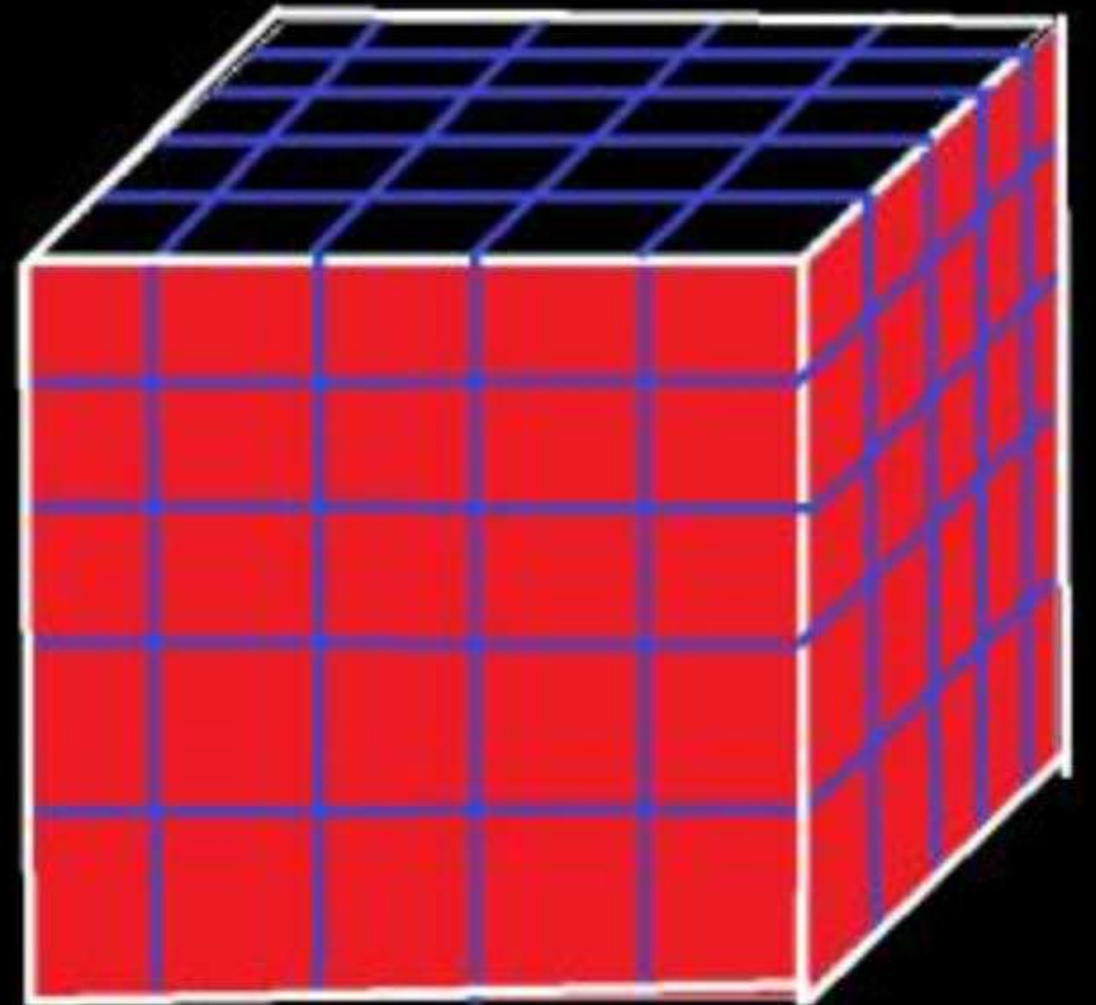




Q. How many cubes will be formed?

4 cut

$$\begin{aligned} \text{No. of cubes} &= (4+1)^3 \\ &= 5^3 = 125 \end{aligned}$$



Q. How many cubes will have no face painted at all?

4 'x' cut ✓

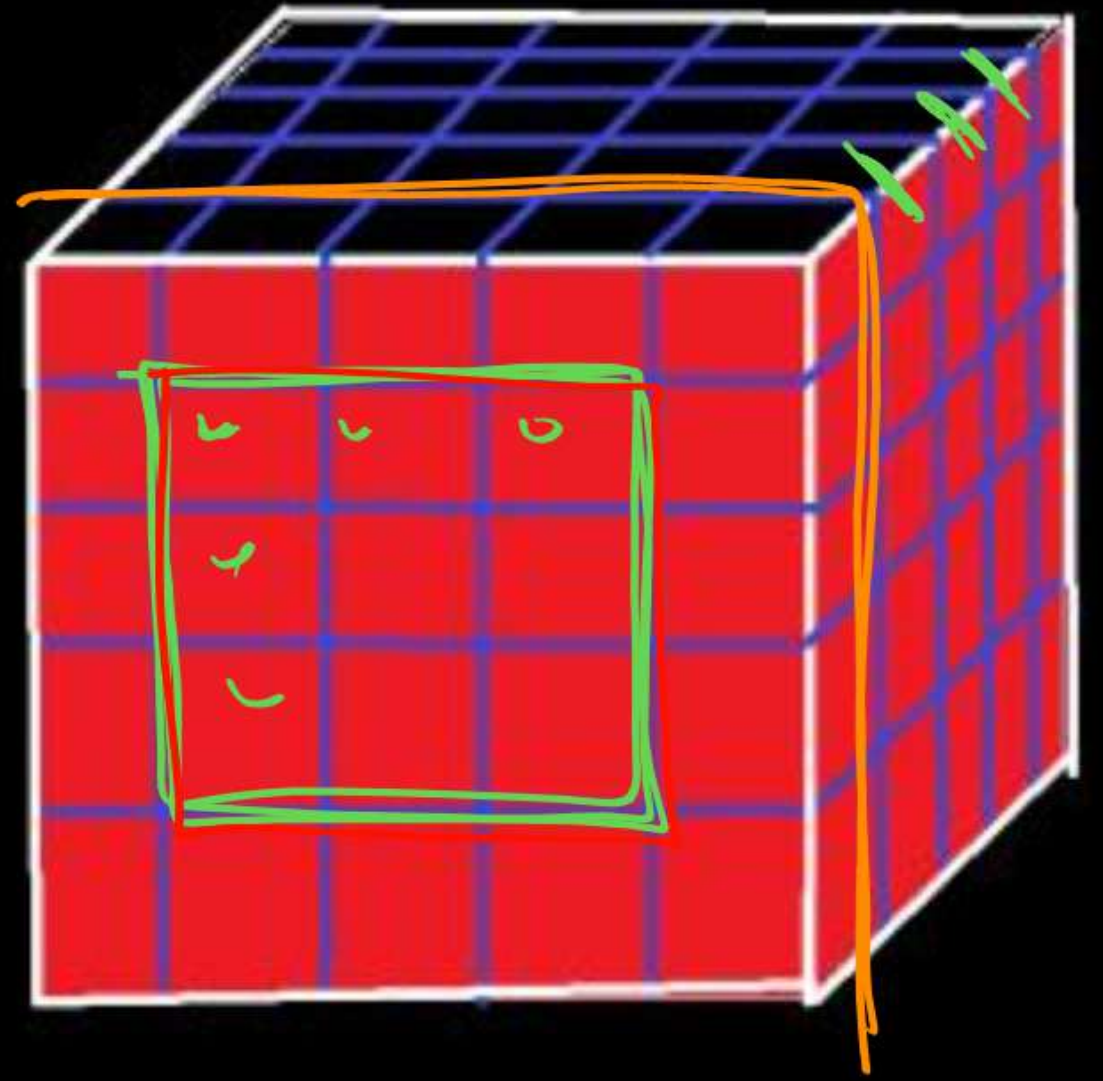
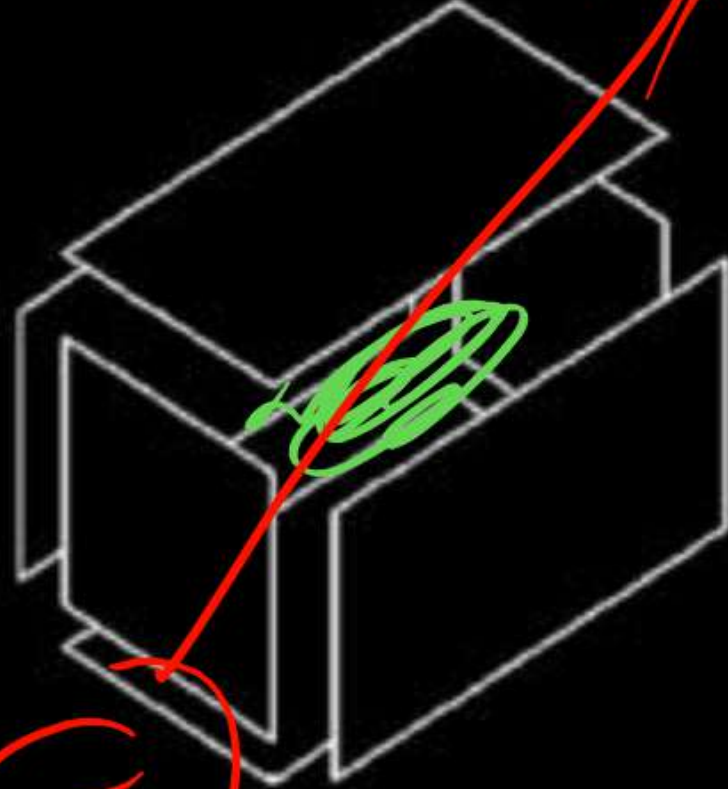
No. of cubes = $(x+1)^3$

No. of cubes × face painted

= $(x-1)^3$

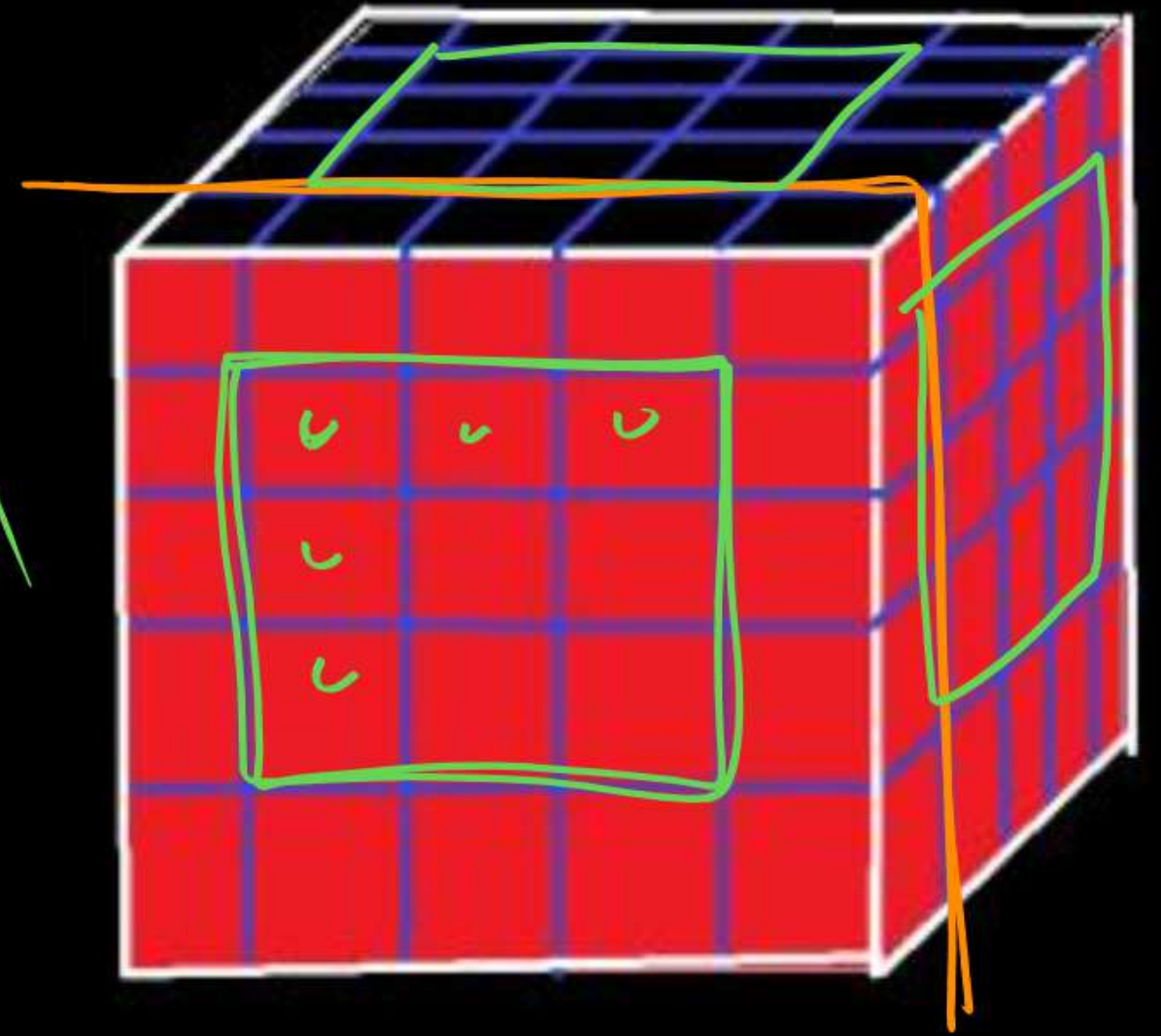
= $3^3 = 27$

$9 \times 3 = 27$



Q. How many cubes will have only one face painted?

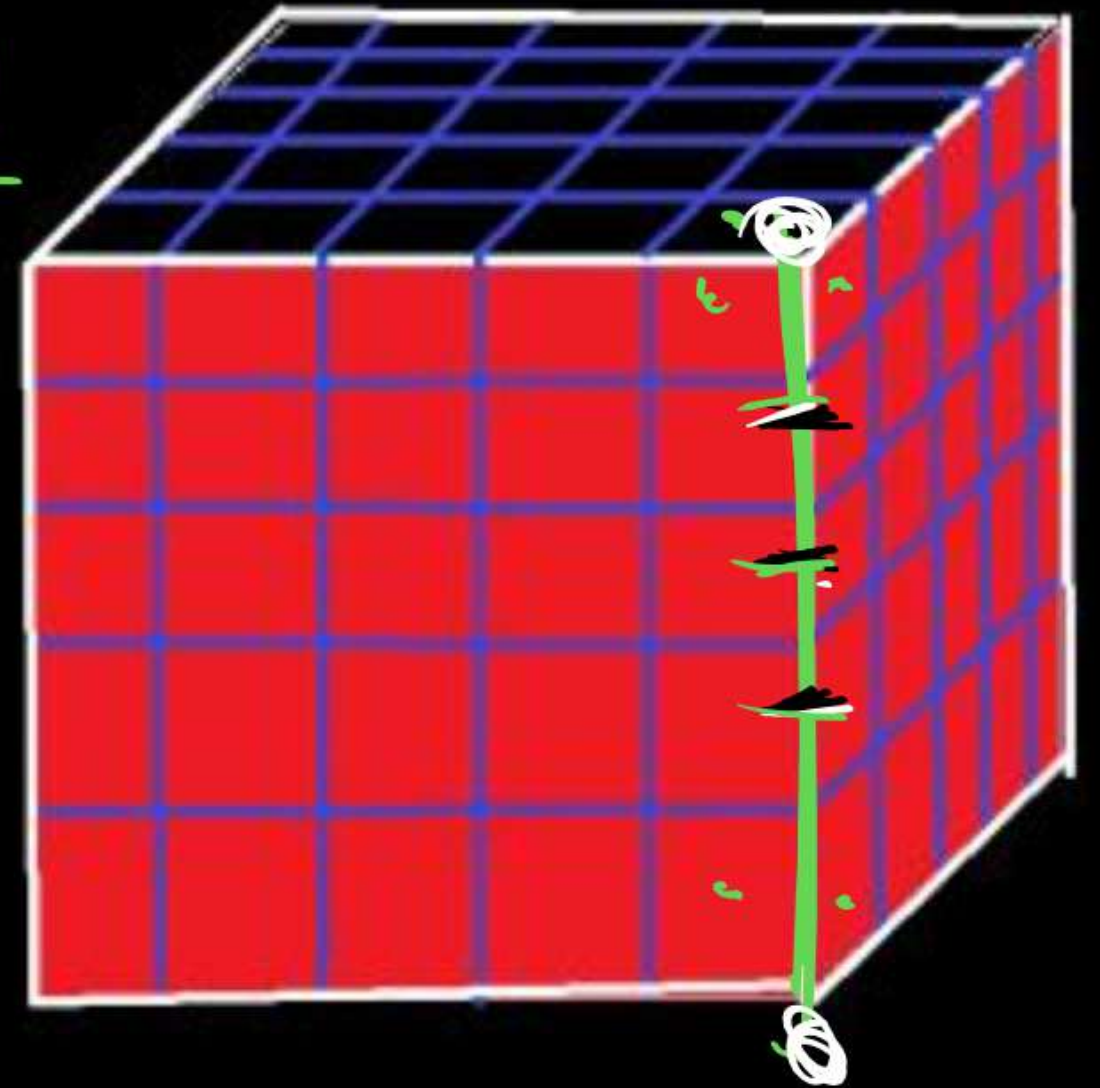
$$6 \times 9 = 54$$





Q. How many cubes will have only two face painted, but with same colour?

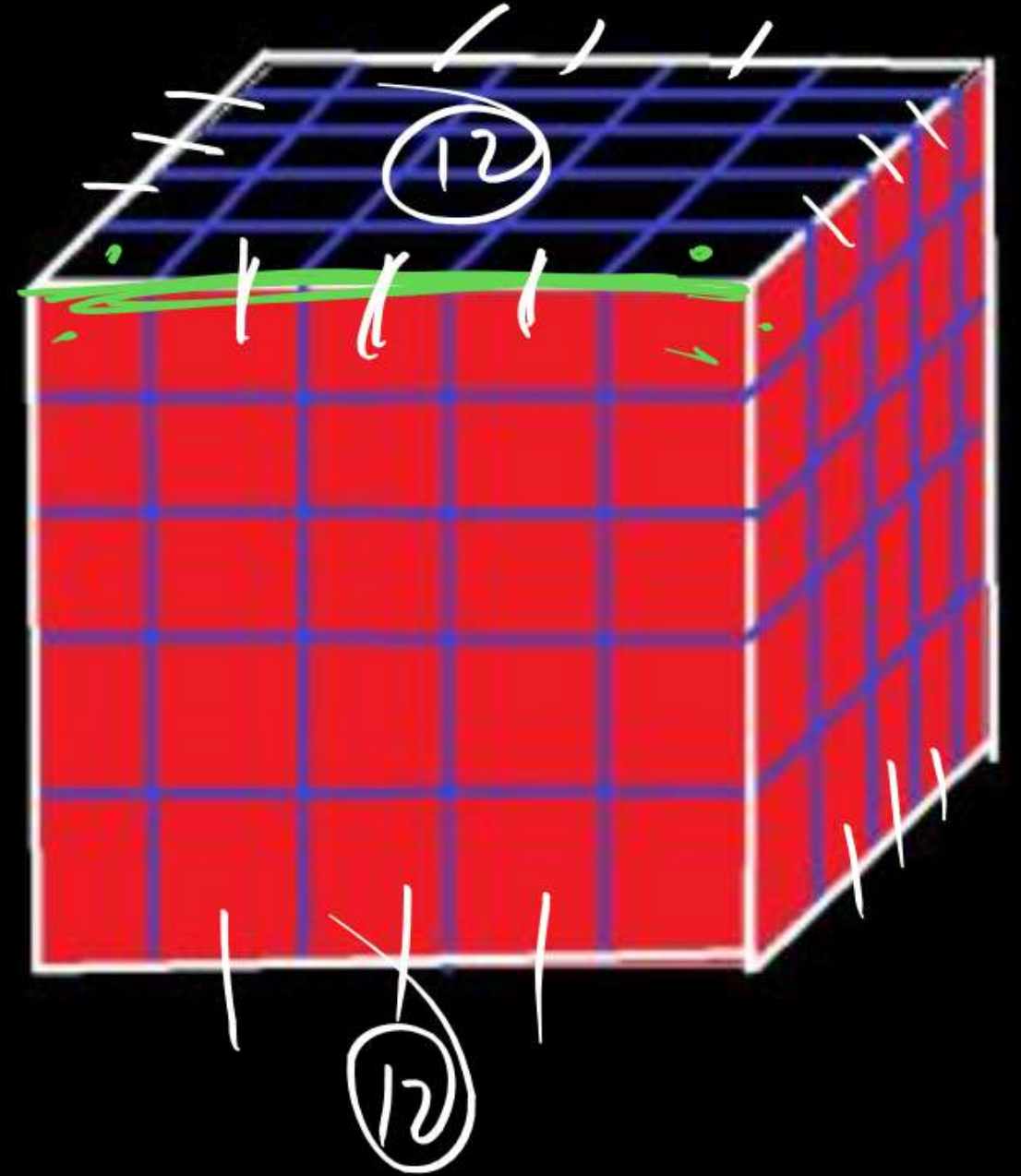
$$4 \times 3 = 12$$



Q. How many cubes will have only two face painted, but with different colour?

$$12 + 12 = \underline{\underline{24}}$$

$$12 \times 3 = \underline{\underline{36}}$$

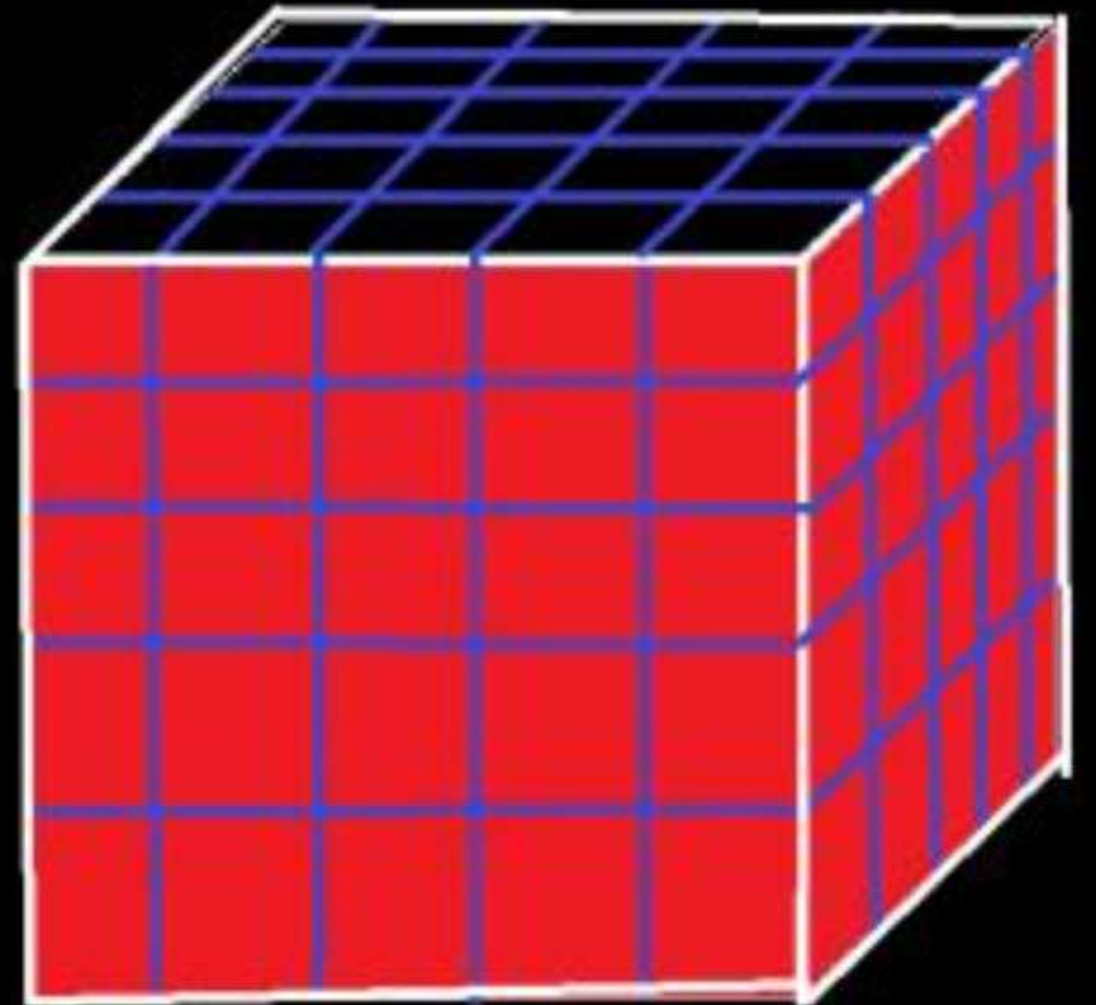




Q. How many cubes will have atleast two face painted?

$$36 + 8$$

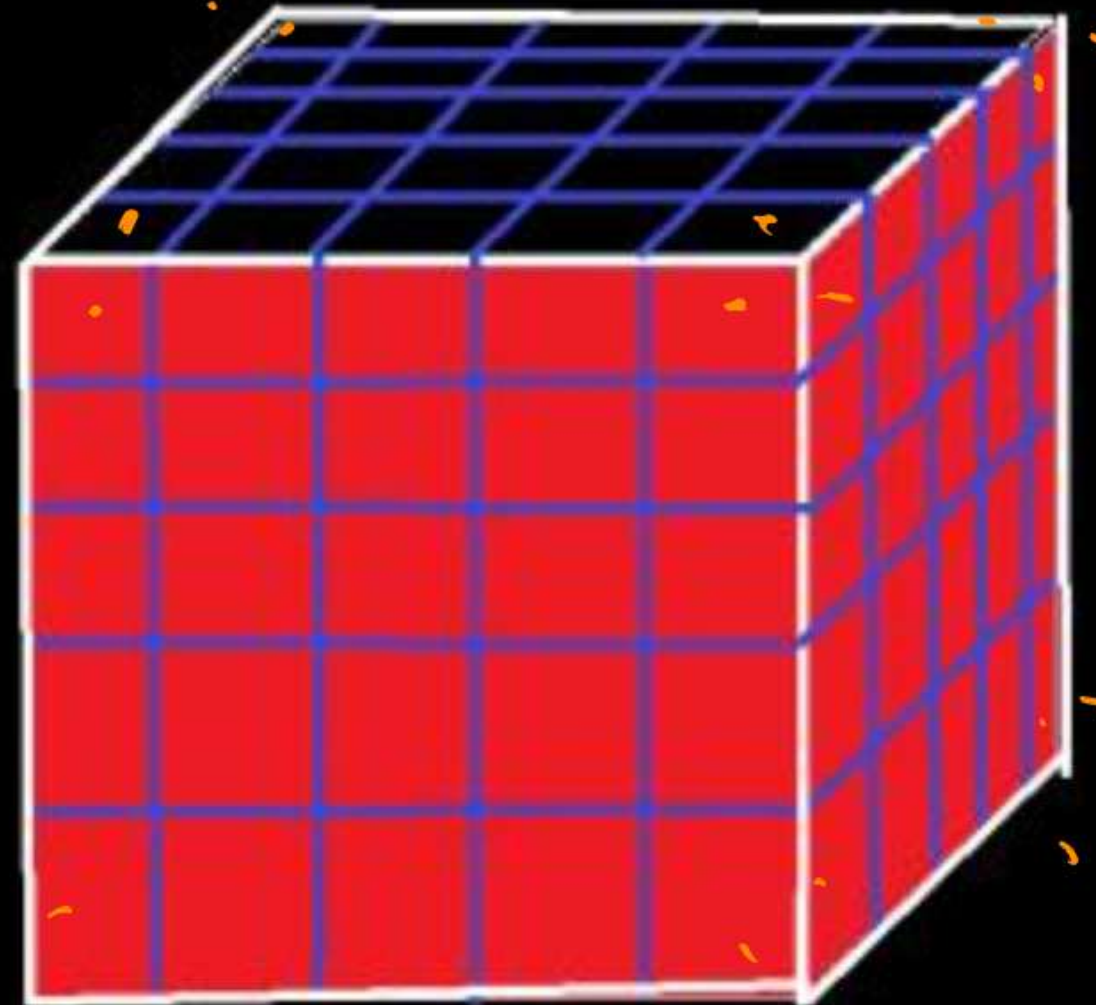
$$= 44$$





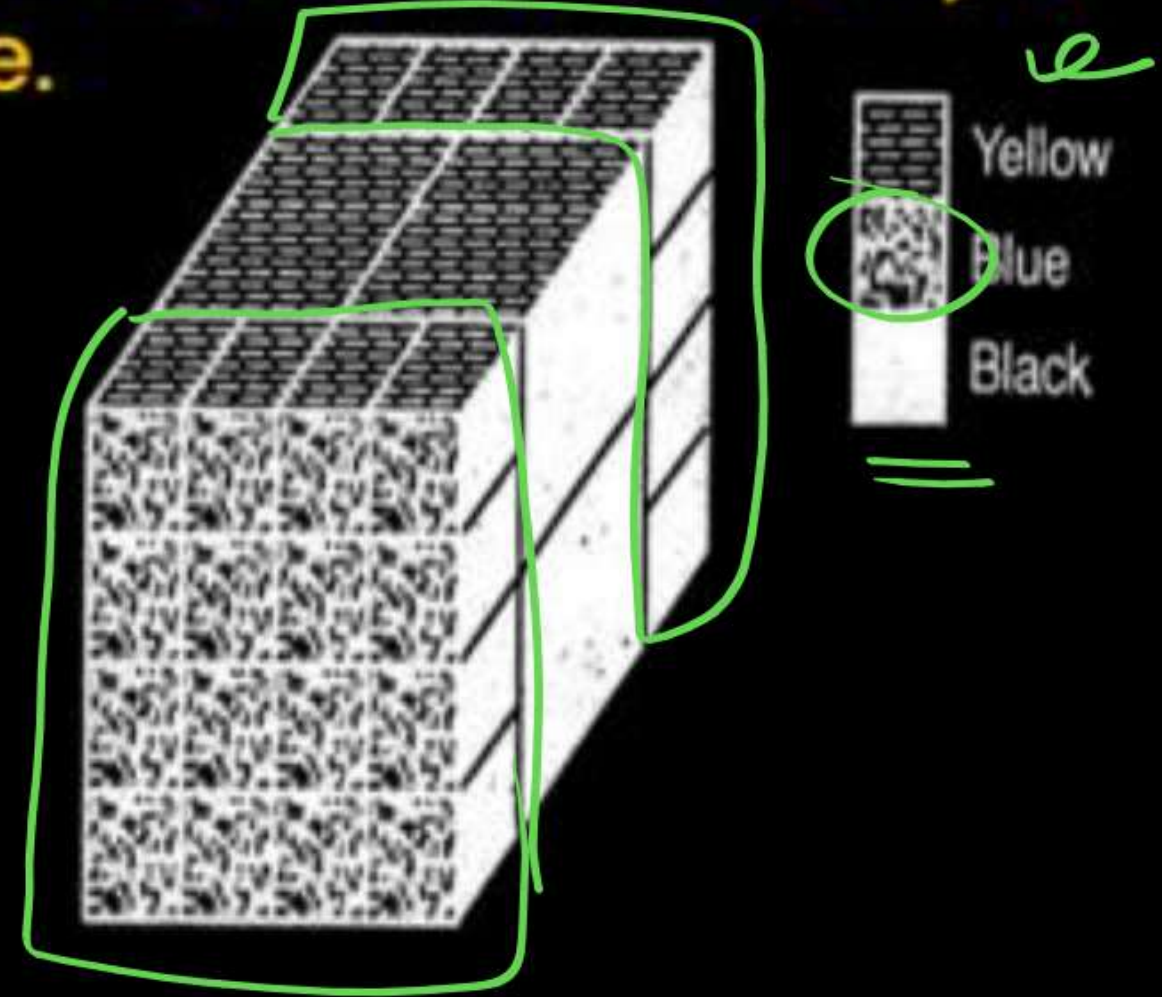
Q. How many cubes will have three face painted?

8





Q. A solid cube has been painted yellow, blue and black on pairs of opposite face. The cube is cut into 36 smaller cubes such that 32 cubes are of the same size while 4 others are of bigger size. Also no face of any of the bigger cubes is painted blue.





Q.

How many cubes have at least one face painted blue.



A.

0



B.

8



C.

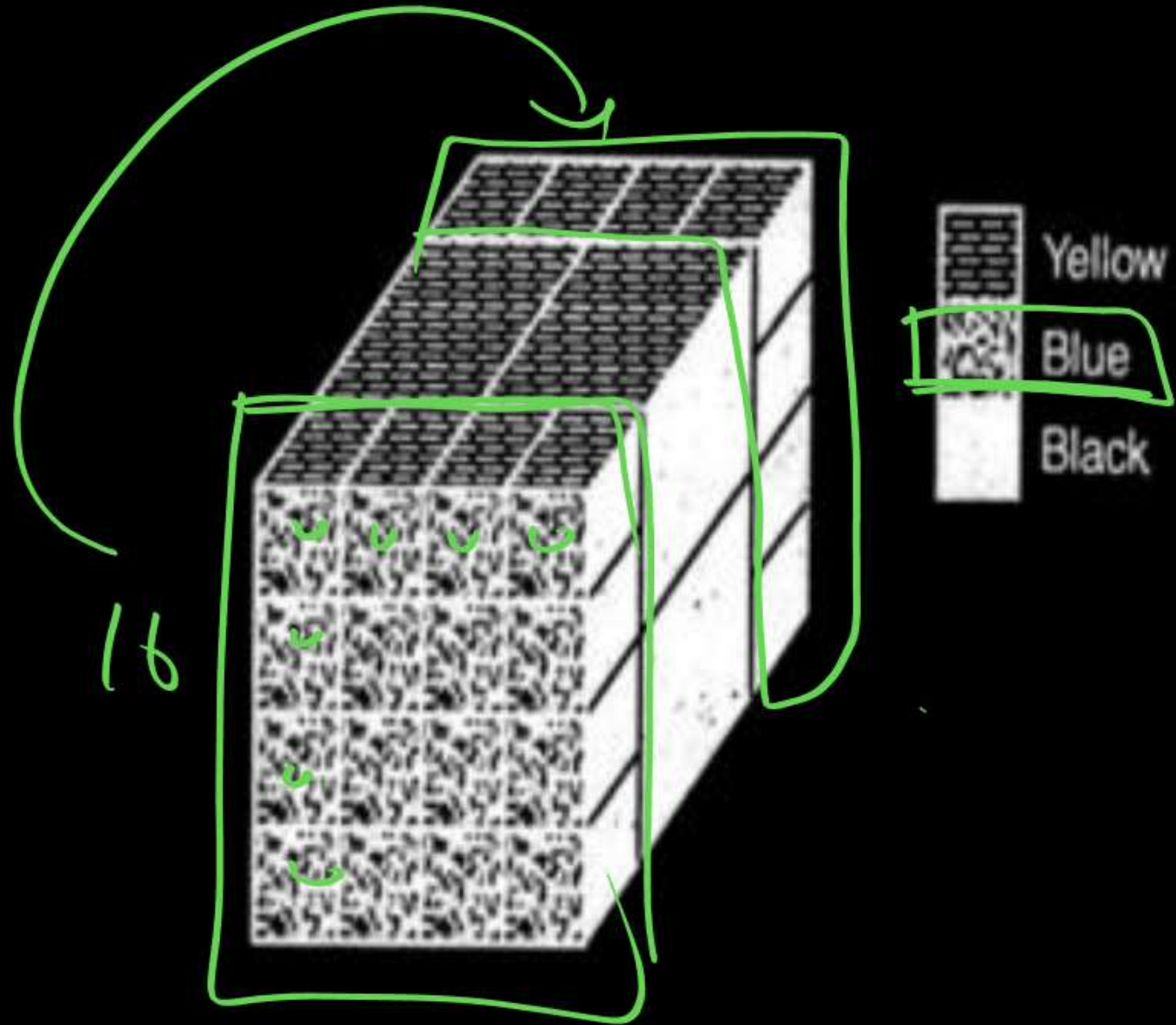
16



D.

32

$16 + 16$





Q. How many cubes have only one face painted.



12



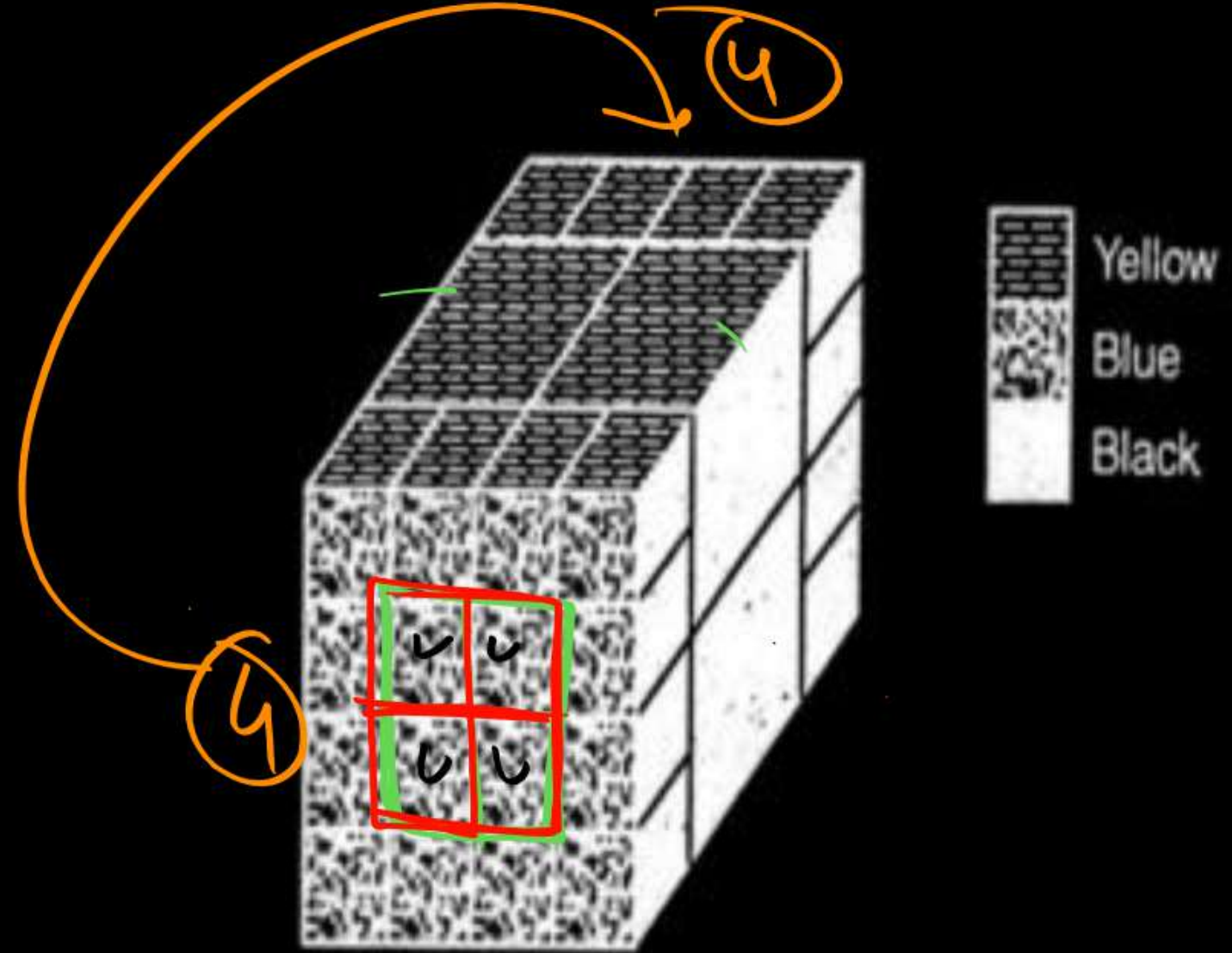
8



4



0





Q. How many cubes have two or more faces painted.

A. 36

B. 34

C. 28

D. 24

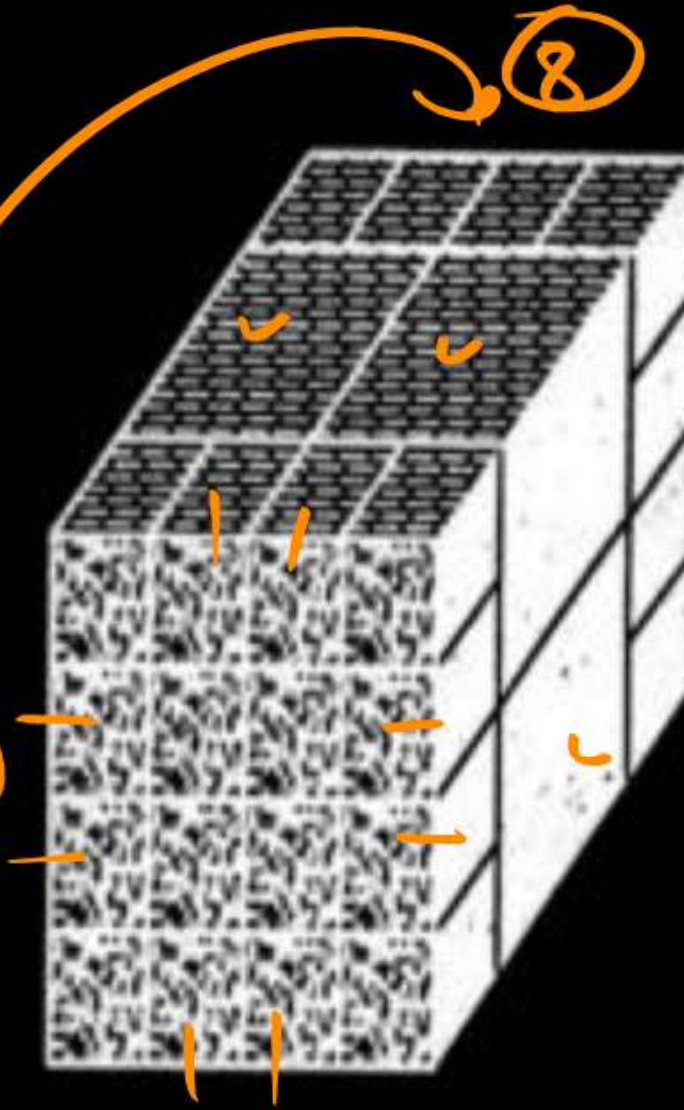
Only two face

→ 20

Big → 4

Small → 14

Three face → 8



$$20 + 8 = 28$$



Q.

How many cubes only three faces painted?



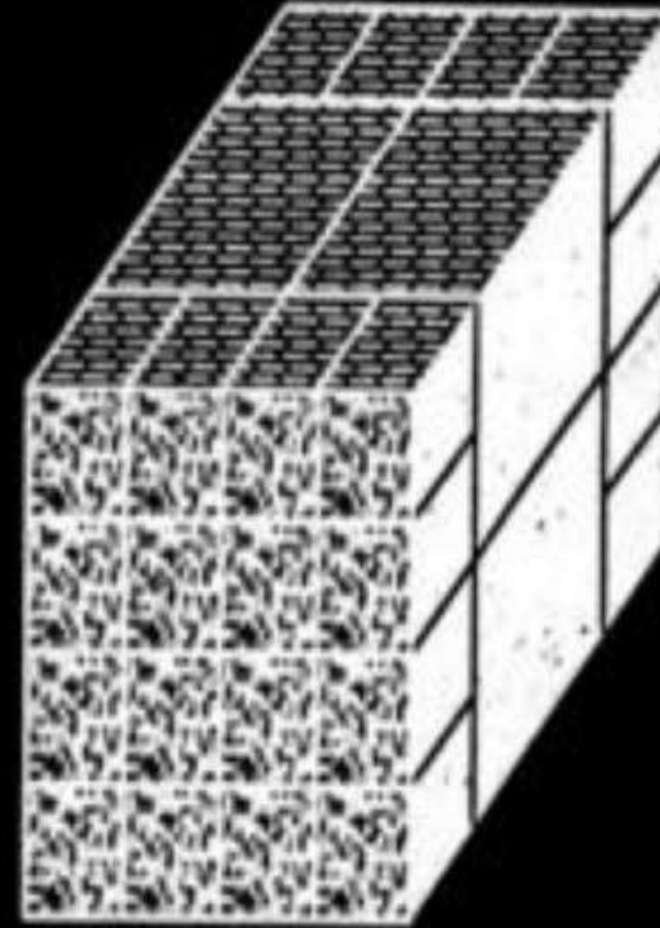
4



2



0



Yellow
Blue
Black



Q.

How many cubes do not have any of their faces painted yellow?



A.

0



B.

8



C.

16



D.

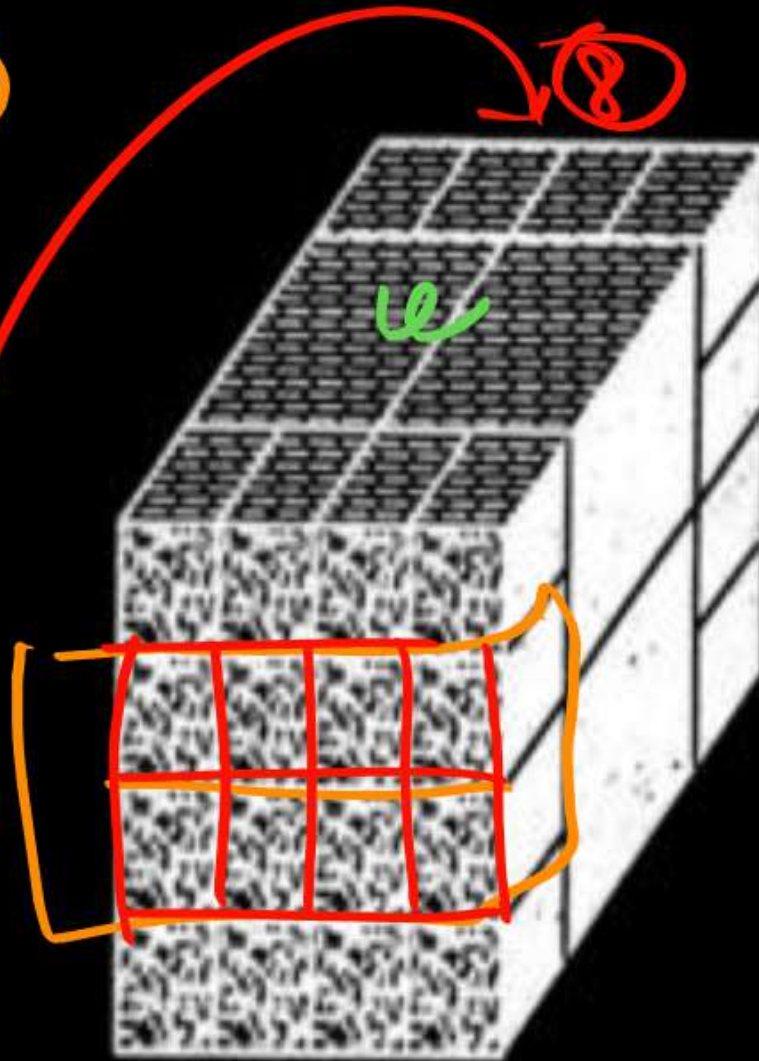
20

Big $\Rightarrow 0$

Small $\Rightarrow 16$

16

8



u



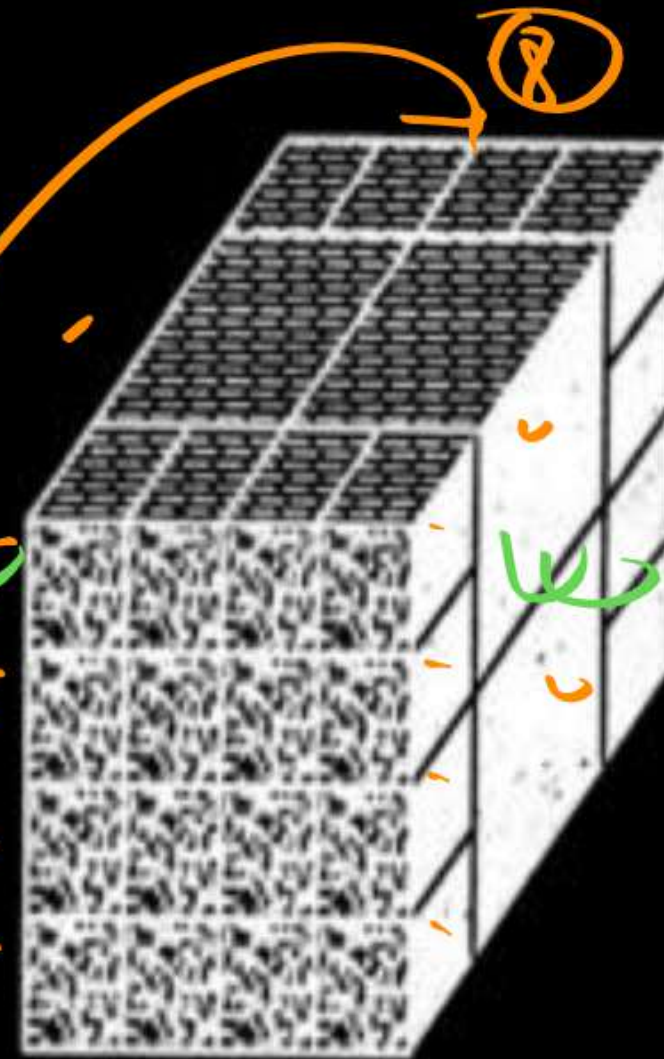
Q.

How many cubes have at least one of their faces painted black?

- ~~A. 0~~
- ~~B. 8~~
- ~~C. 16~~
- ~~D. 32~~

Big $\rightarrow 4$
Small $\rightarrow 16$

20





Q. How many cubes have at least one of their faces painted yellow or blue?

A. 36

B. 32

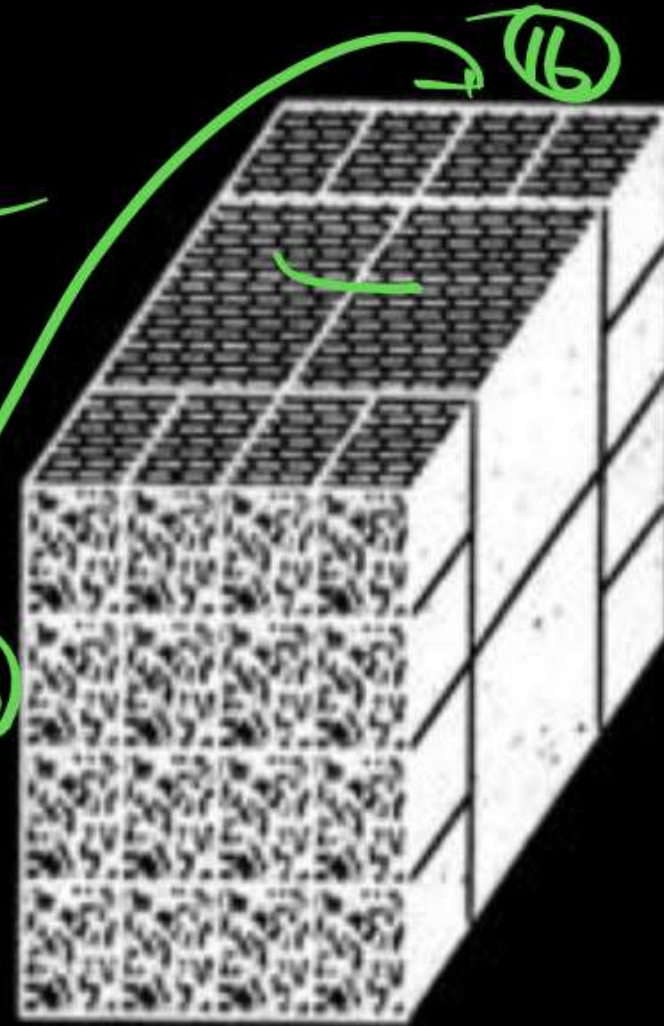
C. 16

D. 0

Small $\rightarrow 32$

Big $\rightarrow 4$

36 16



Yellow
Blue
Black



Q.

How many cubes have no face painted?



A.

0



B.

8



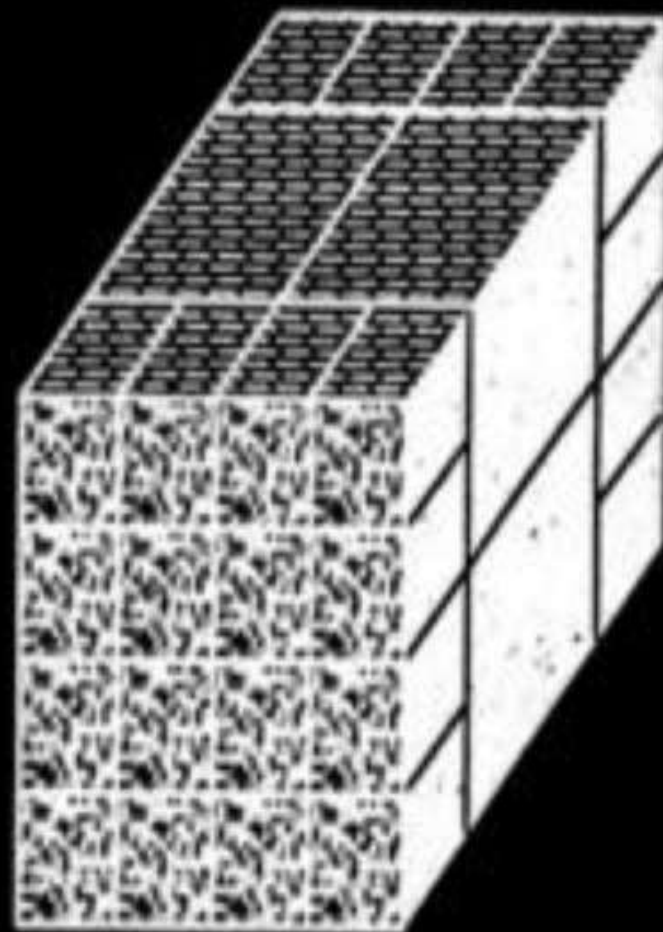
C.

12



D.

16



Yellow

Blue

Black

Assignment



Q.

How many cubes have two faces painted yellow and black respectively?



A.

0



B.

8



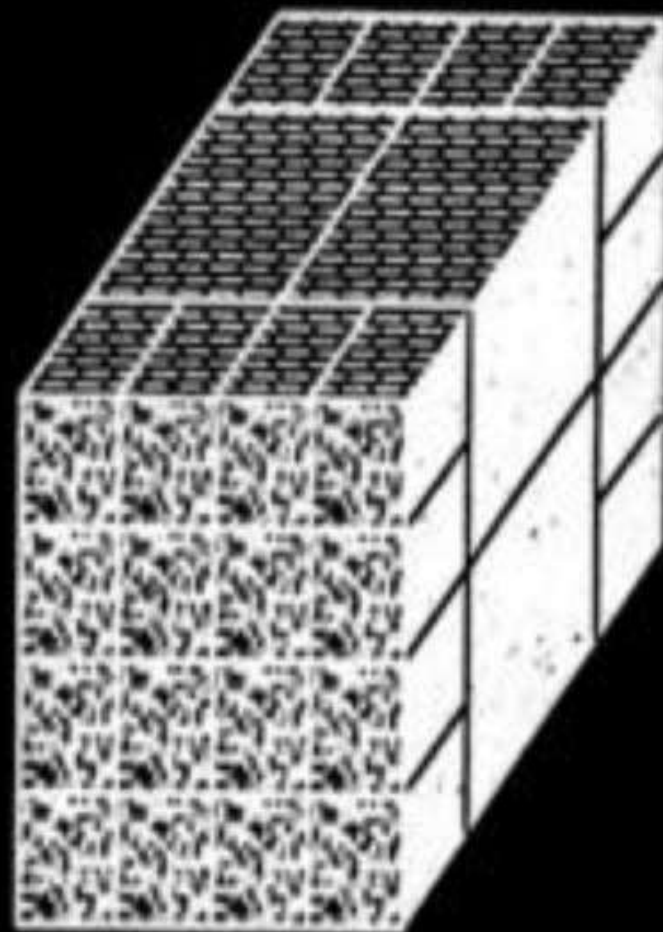
C.

12



D.

16



Yellow

Blue

Black





✓ Standard Dice

$$6 + 1 = 7$$

$$3 + 4 = 7$$

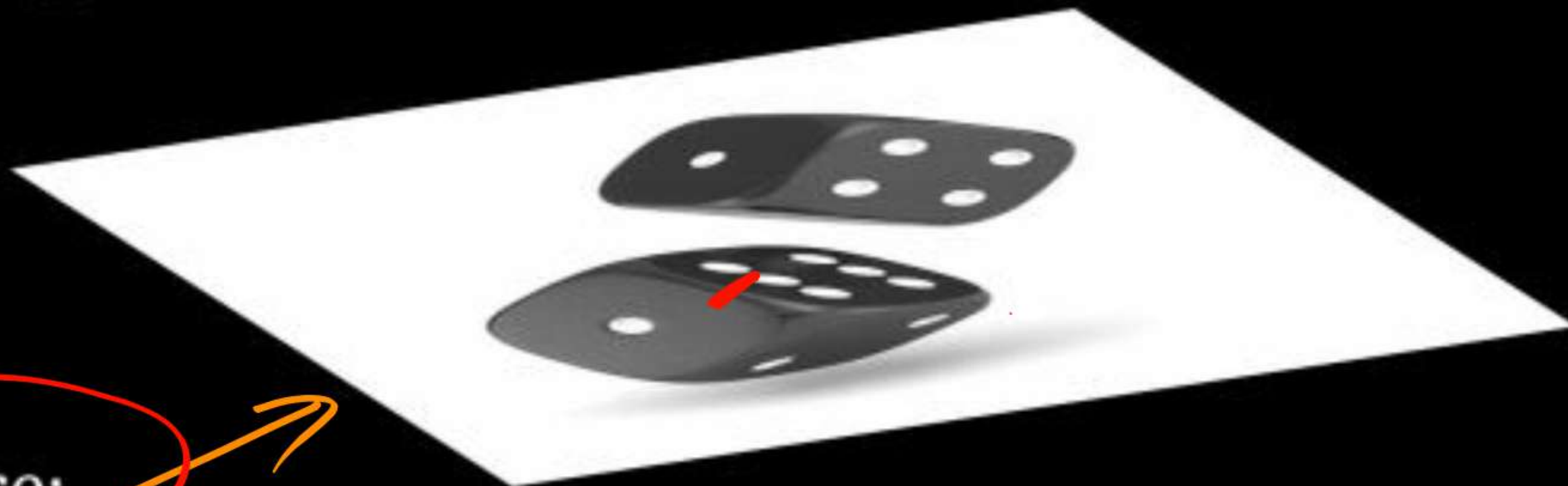
$$5 + 2 = \textcircled{7}$$



Sum of opp face
= $\textcircled{7}$



- Standard Dice: ✓✓



- General Dice: ✓✓



Rules:

①

$A \rightarrow$

$B \rightarrow$



$5 \rightarrow 3, 6, 4, 2$

$5 \leftrightarrow 1^4$



Rules:



$$1 \rightarrow 4, 5, 2, 3$$

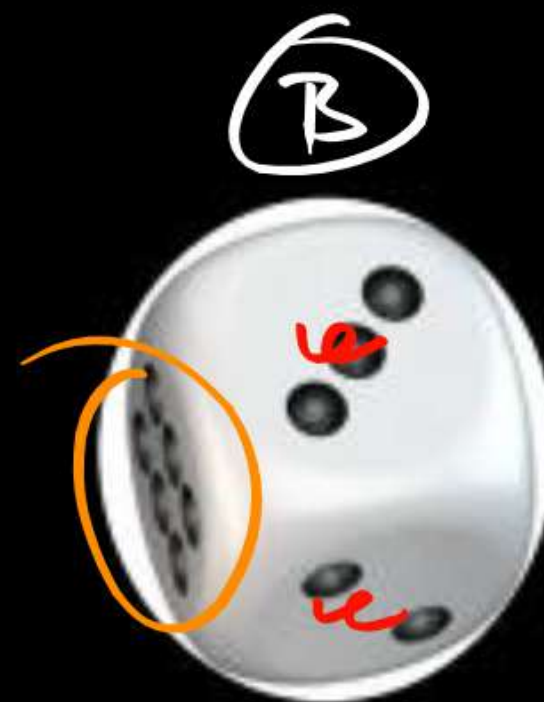
$$\underline{\underline{1 \leftrightarrow 6}}$$



Rules:

②

→ (2 face common)

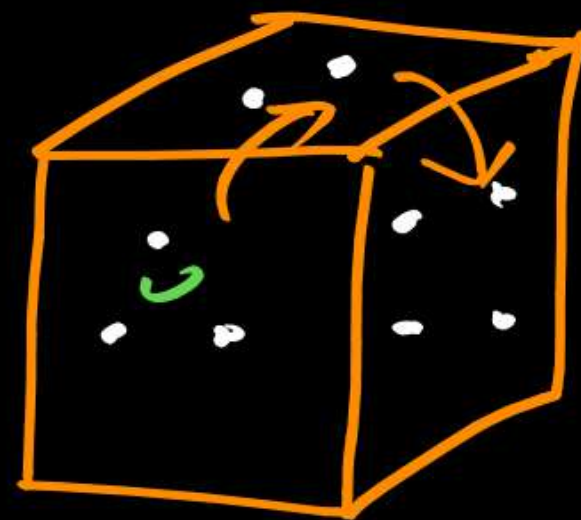
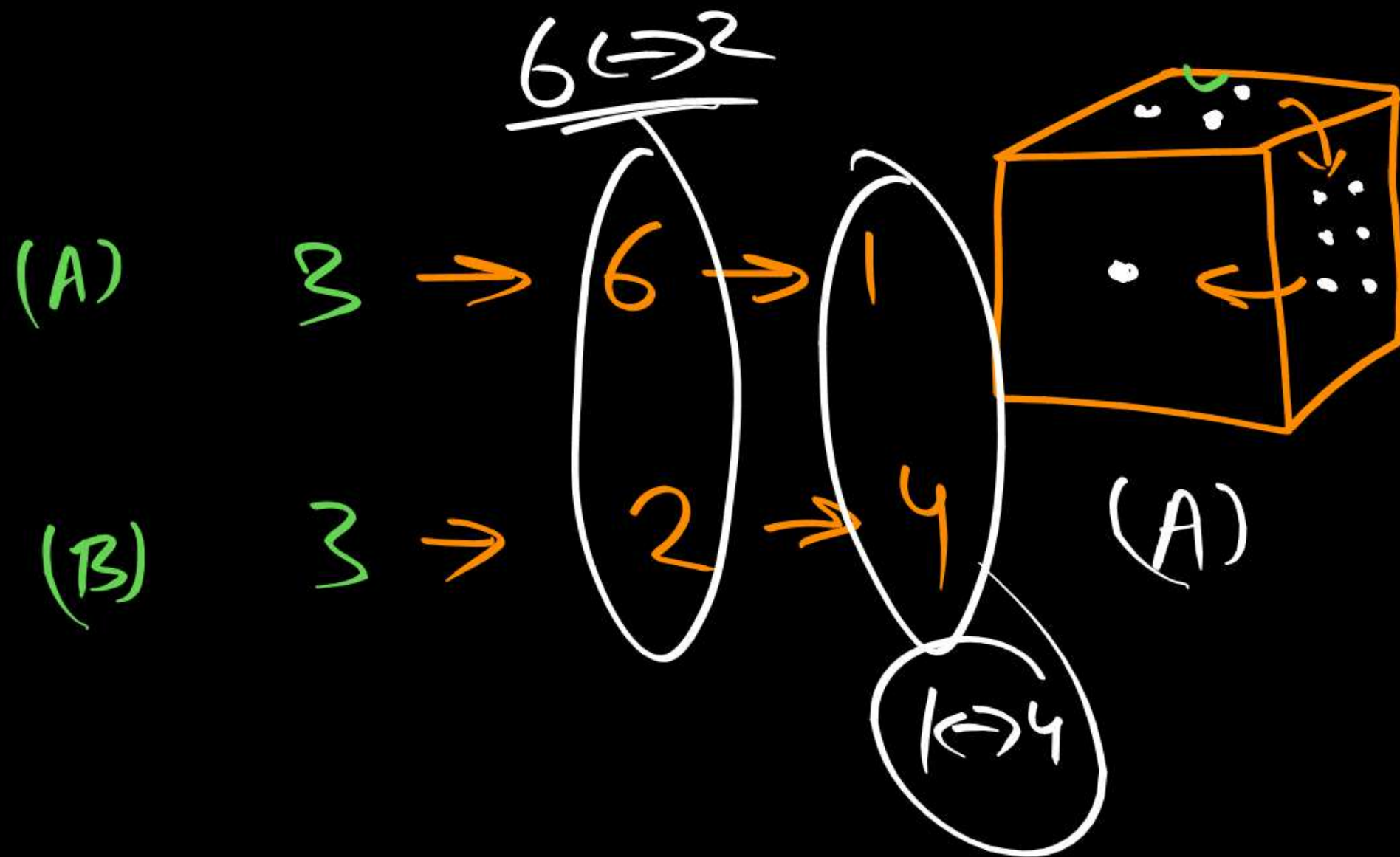


On common
opposite

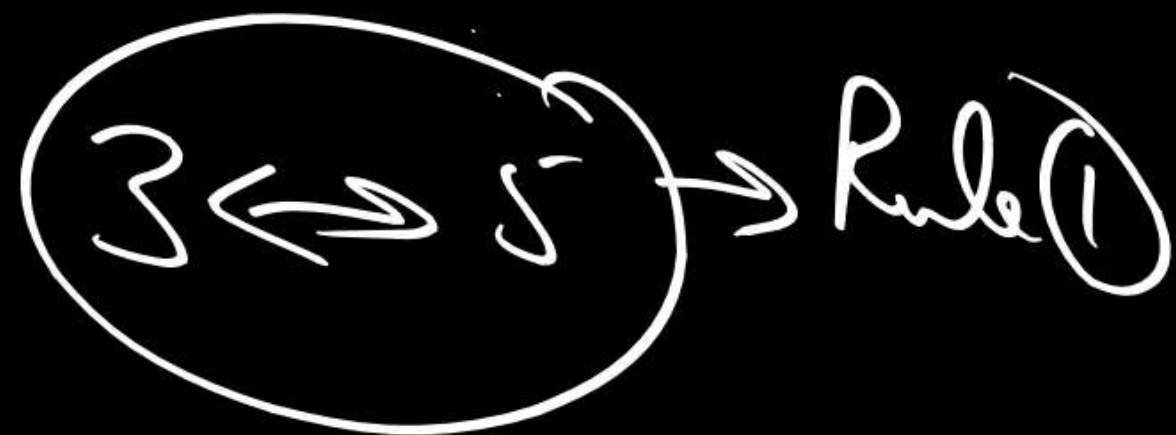
106
//



Rules: ③

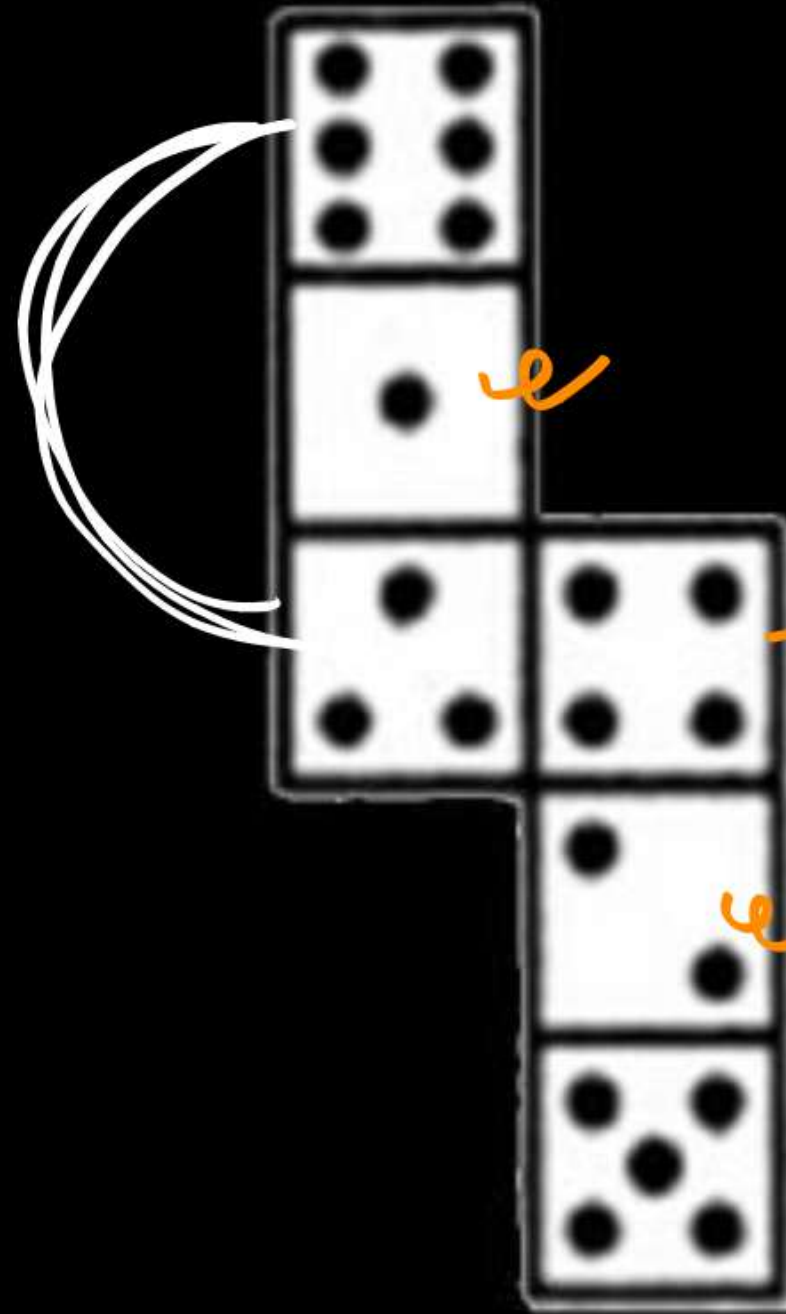


(B)





OPEN DICE



$$6 \leftrightarrow 3$$

$$4 \leftrightarrow 5$$

$$1 \leftrightarrow 2$$



Q.

When the following figure is folded to form a cube, how many dots lie opposite the face bearing five dots?



1



2

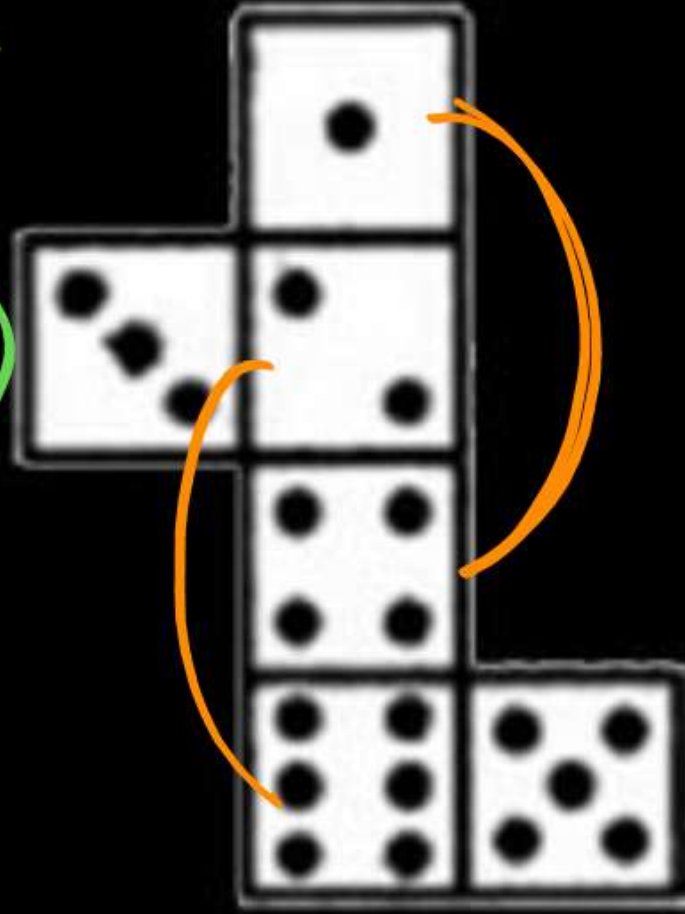


3



4

$1 \rightarrow 4$
 $2 \rightarrow 6$
 $3 \rightarrow 5$

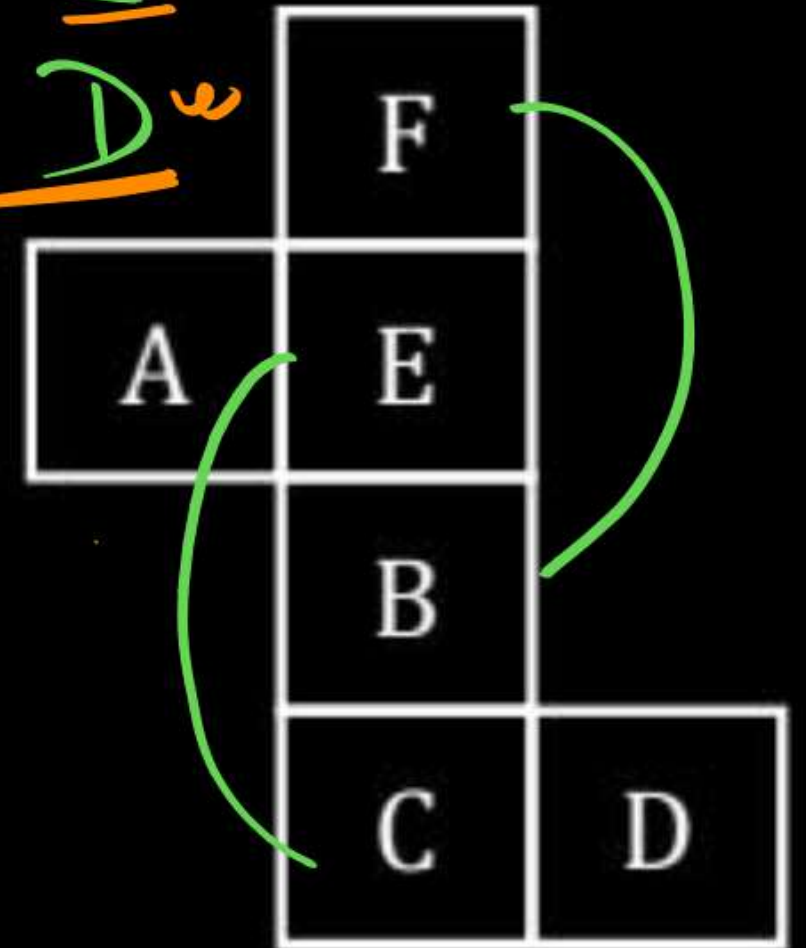




Q. Which cube can be formed by folding the given shape on the right?



Handwritten analysis:
 $F \rightarrow B$
 $E \rightarrow C$
 $A \rightarrow D$



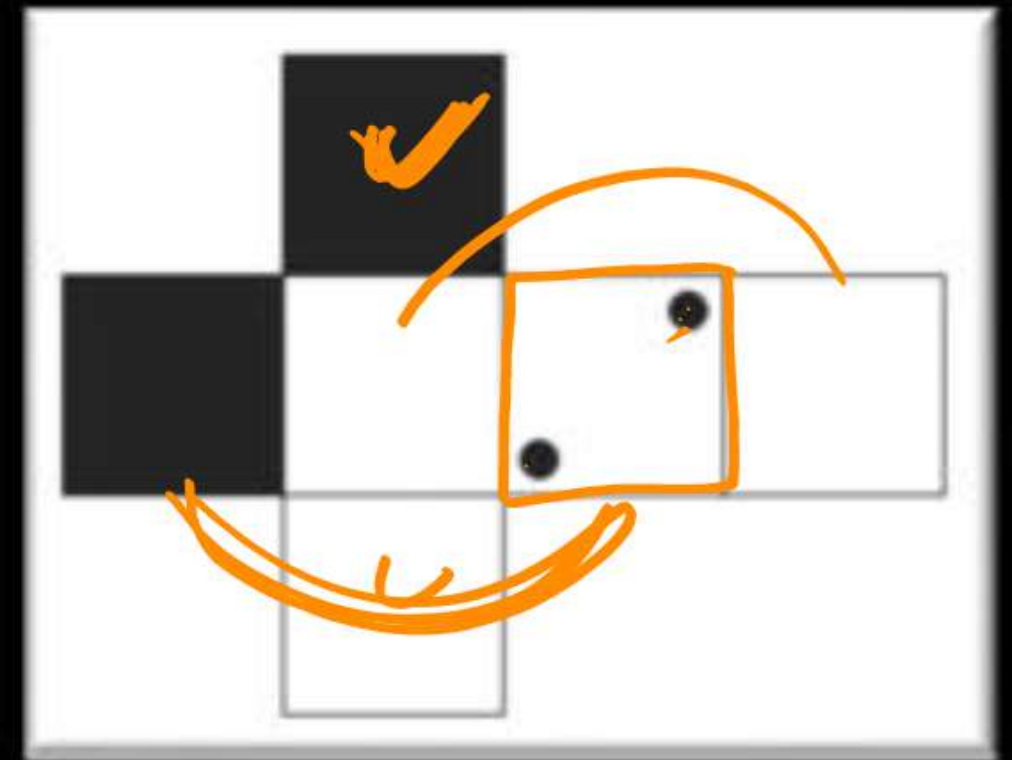
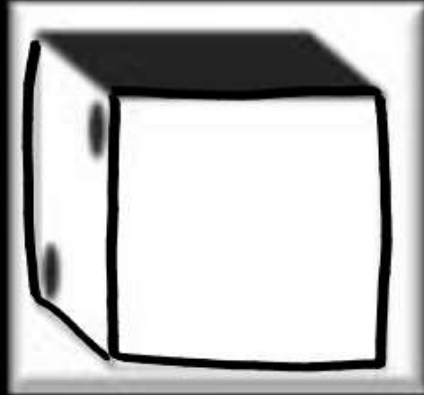
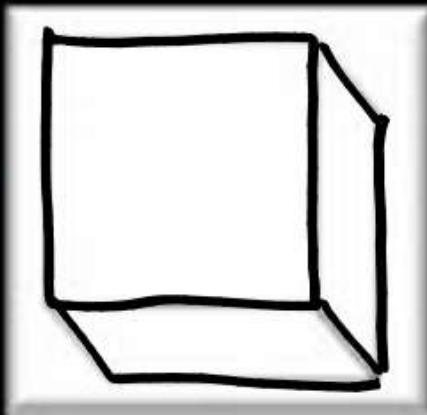
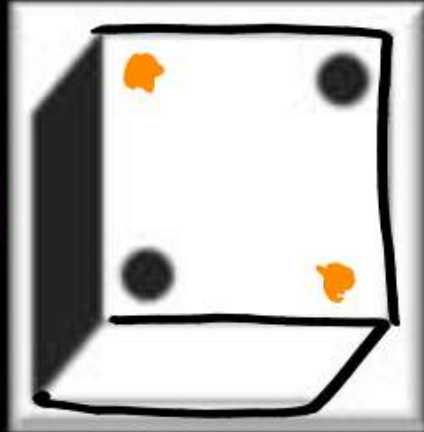


Q.

Which cube can be formed by folding the given shape on the right? (MSQ)

MCQ

✓ Black ↔ white
✓ Black ↔ 2

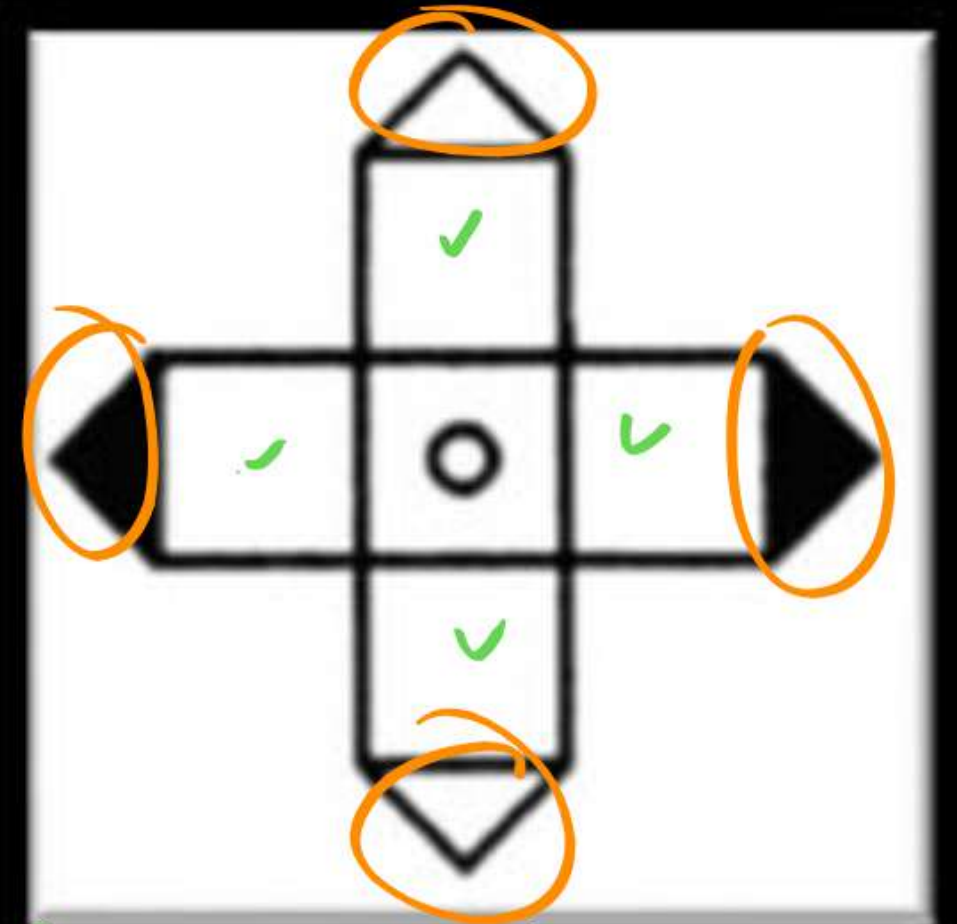
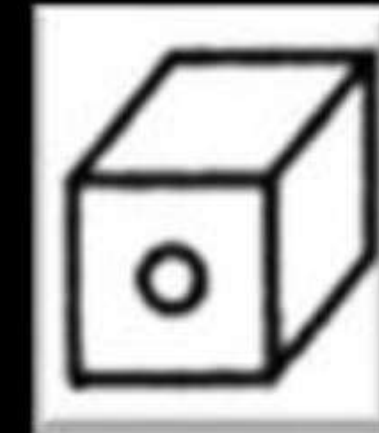
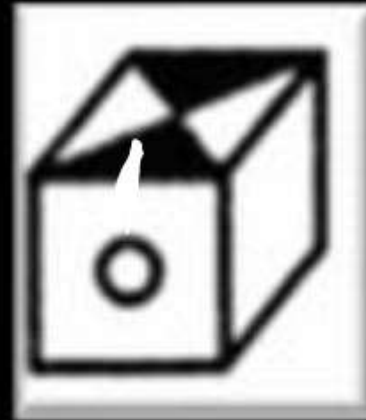


✓ white ↔ white



Q.

Which cube can be formed by folding the given shape on the right?

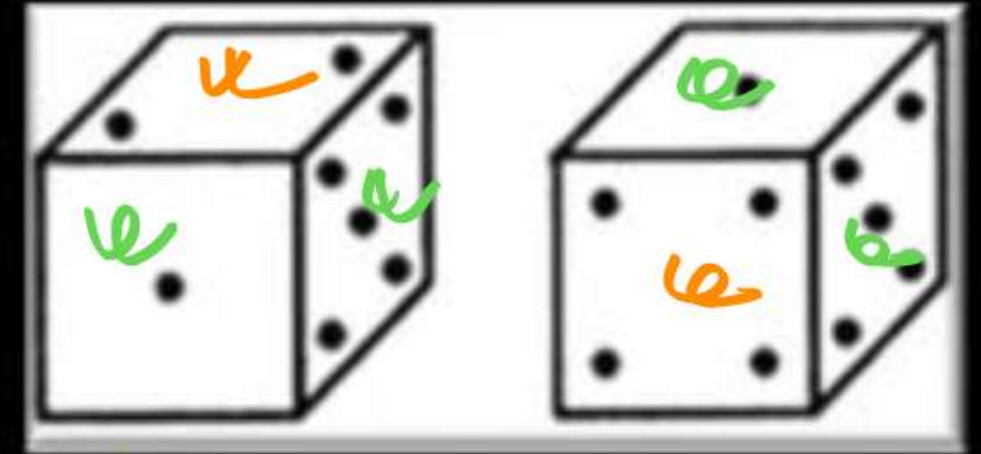


white \leftrightarrow white
white \leftrightarrow white



Q. Observe the dots on a dice (one to six dots) in the following figures. How many dots are contained on the face opposite to that containing four dots?

Rule $\rightarrow 2$



$2 \leftrightarrow 4$



Can't be determined



Q.

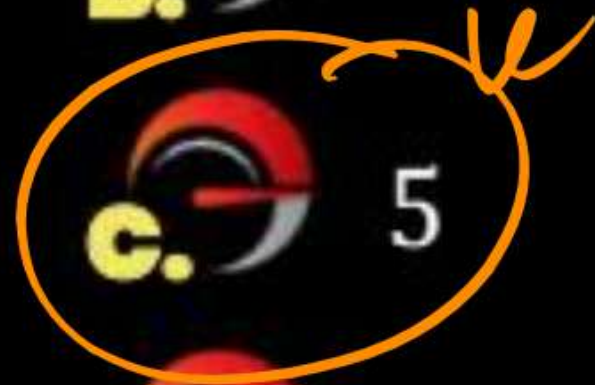
Three different positions of a dice are shown below.
How many dots lie opposite 2 dots?



1



3



5



6

$5 \Rightarrow 1, 6, 3, 4$

$5 \Leftrightarrow 2$



(A)

(B)

(C)



The six faces of a dice have been marked with alphabets A, B, C, D, E and F respectively. This dice is rolled down three times. The three positions are shown as:

Find the alphabet opposite A.

Assignment

A. C

B. D

C. E

D. F





Q.

Two positions of a dice are shown below. If the face with 1 dot is at the bottom, then the number of dots on the top is



A.

2



B.

3



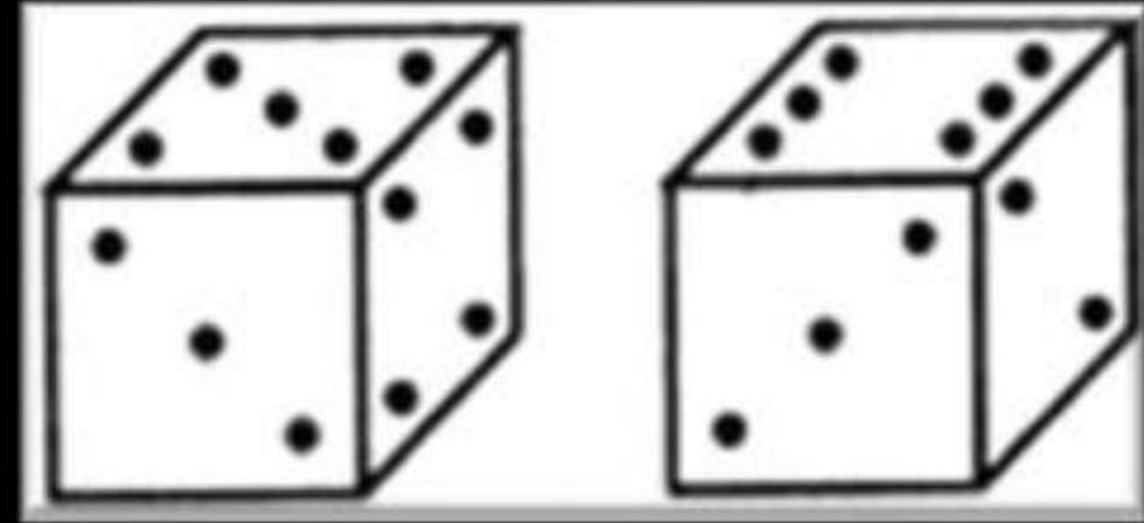
C.

5



D.

4



Assignment



Q.

Two positions of a dice are shown below. If the face with 1 dot is at the bottom, then the number of dots on the top is



A.

2



B.

4



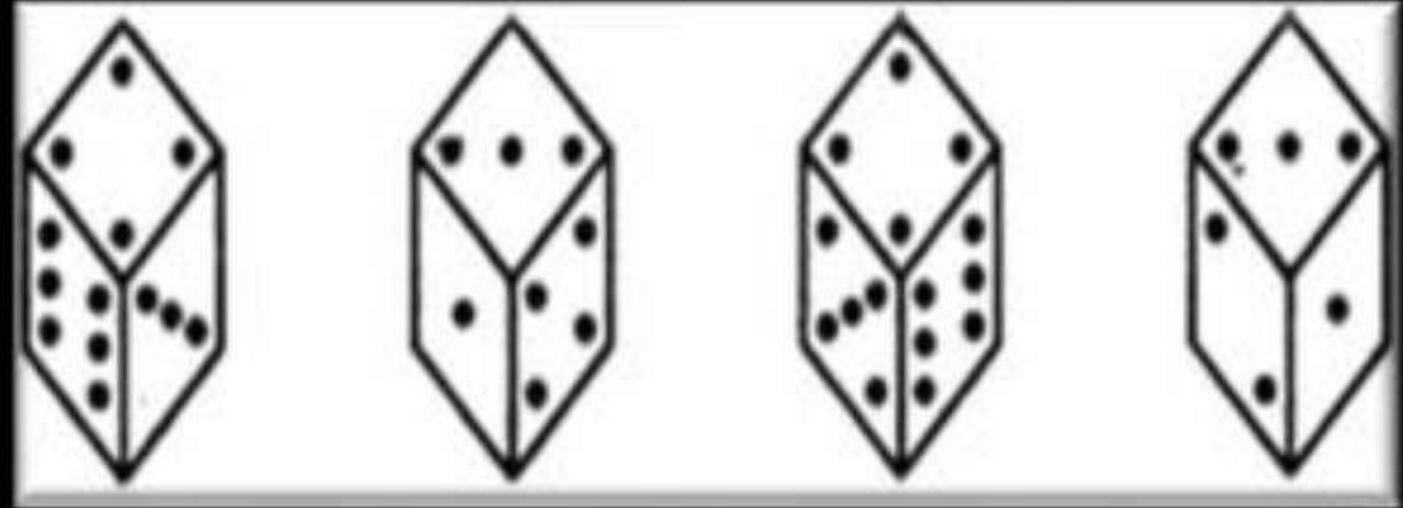
C.

5



D.

6



Assignment



Q.

A cube has six different symbols drawn over its six faces. The symbols are dot, circle, triangle, square, cross and arrow. Three different positions of the cube are shown in figures X, Y, and Z. Which symbol is opposite the dot?



A.

Circle



B.

Arrow



C.

Cross



D.

Triangle



(x)

(y)

(z)

Assignment

