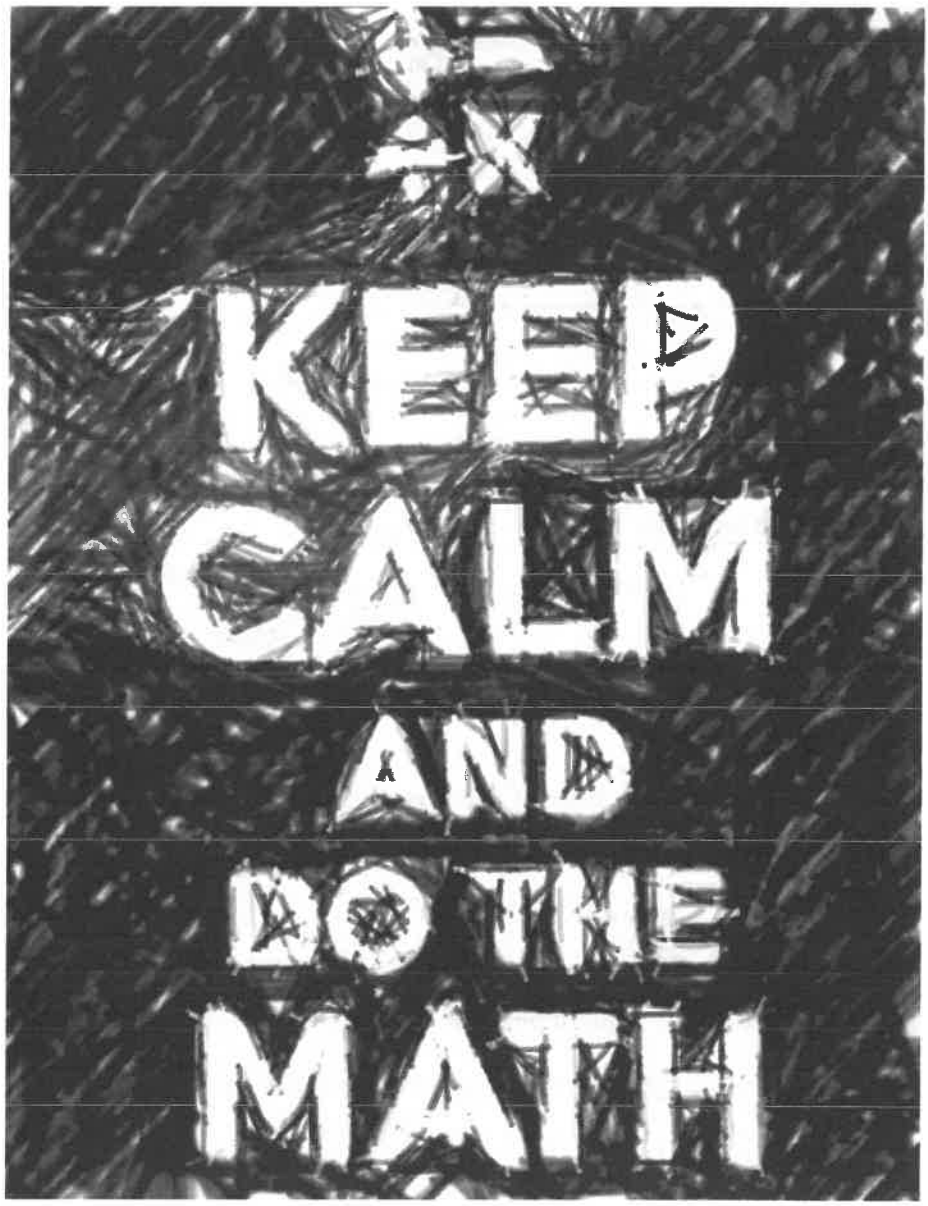
NAME: _____

Math P.A.T. Prep

Areas / Areas from Volume/
Problems that combine Area and Perfect Squares
SOLUTIONS



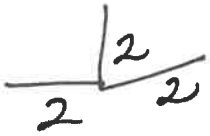
St. Brendan School
Mr. Martínez

AREAS FROM VOLUME

- Use volume to find side length
- EVERY P.A.T I've studied has 1 problem with the volume of a cube
- this is good news...

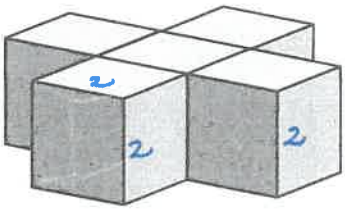
If volume = 8
Side length = 2

V = base × height × width
But since cubes have equal lengths, then
(V = side length³)

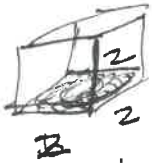
If  V = 8, then  side length = 2

The following 3-D object is composed of identical cubes. The volume of each cube is 8 cm³.

5 cubes
total faces = 30
total 8 faces
22 faces



volume of 8
↳ → base × 2 = 8
area of 4
side length → 2

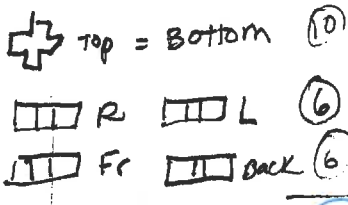


14. What is the **total** surface area of the 3-D object shown above?

A. 120 cm²
B. 100 cm²
C. 88 cm²
D. 72 cm²

Strategy: · Draw 6 views: Front, back, top, bottom, Right, left
· add all faces

Method 1



22 faces

Method 2

cubes → 5
total faces → 5×6 = 30
overlaps → 4
overlap faces = 4×2 = 8
Total faces → 30−8
= 22 faces

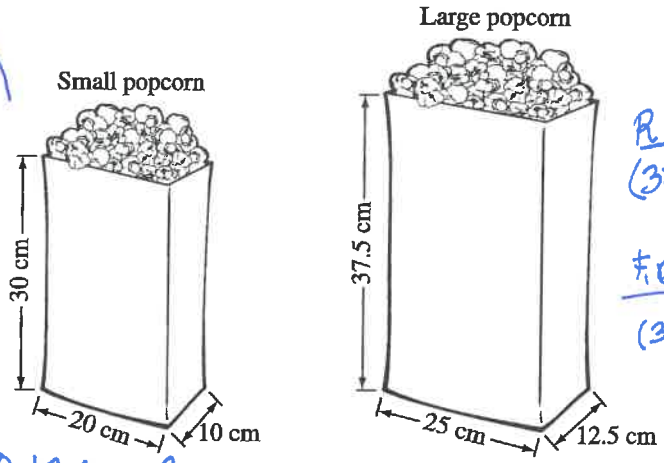
CAREful

If side length is 2, then you must multiply total faces × 2!

Area of each face → 2 × 2 = 4 cm²

total S.A = 22 faces × 4 cm²/face
= 88 cm²

The local movie theatre sells two sizes of popcorn. The large bag of popcorn is a scale enlargement of the small bag.



SA small

R, L
$(30 \times 10) \times 2$
$= 600$

F, Back
$(30 \times 20) \times 2$
$= 1200$

Bottom
20×10
$= 200$

Total: $1200 + 600 + 200 = 2000\ cm^2$

R, L
$(37.5 \times 12.5) \times 2 =$
937.5

F, Back
$(37.5 \times 25) \times 2 =$
1875

Bottom
(25×12.5)
312.5

Total: $3125\ cm^2$

- Recognize that these "popcorn bags" are rectangular prisms!
- they are "opened" so when calculating S_A, do not include the top

Numerical Response

Subtraction

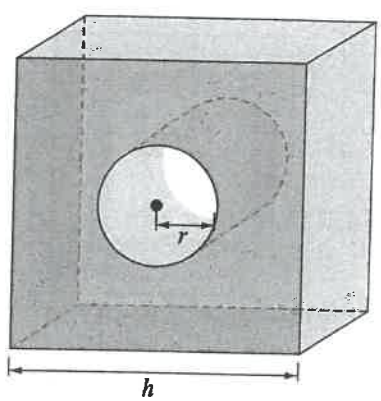
same as surface area

2. The difference between the exterior surface area of the large popcorn bag and the small popcorn bag is 1125 cm^2.

$3125\ cm^2 - 2000\ cm^2 = 1125\ cm^2$

(Record your answer in the numerical-response section on the answer sheet.)

The 3-D object below is a **cube** with a right cylinder cut out.



13. Which expression represents the surface area of the 3-D object?

A. $6h^2 - 2\pi r^2 + 2\pi rh$

B. $4h^2 - 2\pi r^2 + 2\pi rh$

C. $6h^2 + 2\pi r^2 - 2\pi rh$

D. $4h^2 + 2\pi r^2 - 2\pi rh$

$6h^2 - 2\pi r^2 + 2\pi rh$

Area of a cube

- 6 faces
- each face

Area $= h^2$

- area of 6 faces $= 6h^2$

area of cylinder

$2\pi r^2 + 2\pi rh$

Since we are removing a cylinder from the cube, the total area then is:

Area of cube − area of cylinder