!"#$%&'%(%)*+,-".%&/#$%&!"
'%..,0*1023&4)#0&5#6%/& Volume: A Foundation in Unit Cubes &
7#32,0#)%*'%..,0&89.3"#:%& Students will decompose rectangular prisms to recognize volume as an attribute of solid figures. They will build an understanding of concepts of volume measurements in relationship to unit cubes. Students will also derive the volume formula, then apply the formula to real world situations involving volume. They will then use their understanding of decomposing prisms and the volume formula to recognize volume as additive: the volume of solids comprised of 2 non-overlapping rectangular prisms. * This lesson/unit should be completed after students have been introduced to square unit cubic units. !
;26%<"#6%/& Four 60 minute lessons& &

+,66 ,0&+,"%&=3#0$#"$&.?/

&

5.MD.3: Recognize volume as an attribute of solid figures and understand concepts of vo measurement.

a) A cube with side length 1 unit, called a Òunit cube,Ó is said to have Òone cubic unitÓ of volume, and can be used to measure volume.

b) A solid figure, which can be packed without gaps or overlaps using n

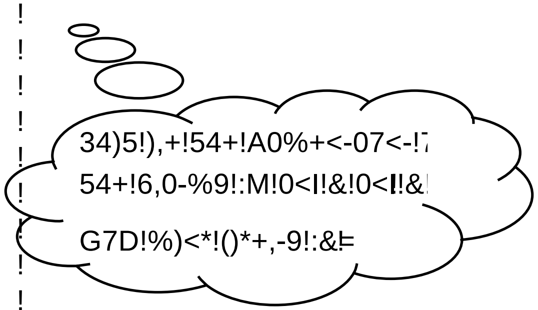
Lesson PART I: Determine Volume of Prisms by Analyzing Layers and Counting Unit Cubes

!!!"#$%&#'(%)*$%(+),%*&)$-(&.)*/01)$2**304)*$%(+),%*5.(%1*)$%*.(%%#,1*/&#-&*%*6)-$0$7%)*1&0/8#.$*#,%-*%8)#&*,-%)'--9$2*
;#66*066-;*$%(+),%$*%-*<-.($*-,*%8)*.-,.)/%*&0%8)&*%80,*%8)*+#<<#.(6%=*-<*+&0;#,1*/&#$>$2

!

You Try!

!
!
!
!
!
!
!
!
!
!
!
!
!



G

!
!
!
!
!
!
!

You Try! Billy is playing with blocks. He lays out a layer of blocks that is 2 by 5 blocks. Then he tells his friend that he plans to add 2 more layers just like the bottom layer. What will the volume of BillyÕs structure be once he finishes adding layers?

!

!!!!!!!!!!!!!!!"#$$%&$'!(%+,

!
!
!
!
!
!

!!!!!!!!!

-+"./!0123!44 5!2+$*)#/6!7.8/)#/6!789#:!;/#)'!).!)<+!=.$8>+!?.,>8$* !

TQ)%6(!-!Given a rectangular prism, use the its dimensions to derive the volume formula.

!

!

!

!

!

"!

!

!

!

!

!

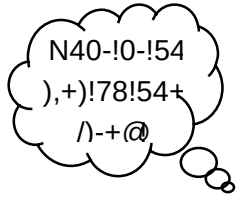
!

"!

!

!

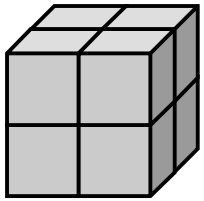
!

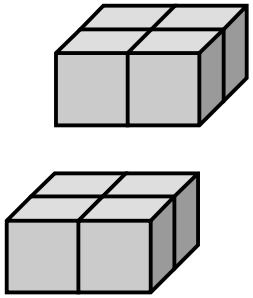


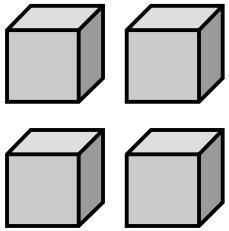
[redacted]

F7.!N,*X Given a rectangular prism, use the formula derived in the previous examples to find the volume.

!







!

!

!

!

!

!

!

Y.0$B3,05+!!F<*)!#'!)<+!D.,>8$*!D.,!D#/B#/6!G.$8>+H!!I.J!#'!G.$8>+!,+$*)+B!).!>8$)#E$#:*)#./!*/B!*BB#)#./H!

!

!

!

!

!

!

!

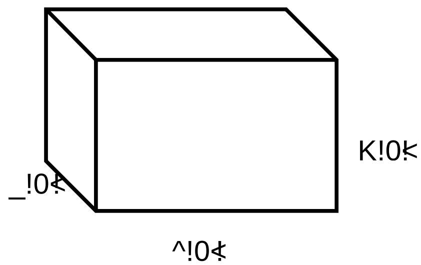
!

-+"./!   0123!4445!;'#/6!)<+!=.$8>+!?.,>8$*

!

@#,+:34 50.6343422.6457 1 0.4 1 0.1 1 0.1 cCA ÁE 40A1.)!A Q Q q 44.39431 9.354337 699.36 593.2914 re W n /Cs1 cs 0 0 0 sc

TQ)%6(!#!E),7(!0-!$7<-5,.$50<;!)!/7Q!57!47(A!4+,!/77B%),B!$7((+$507<@!!L5!4)-!)!(#,!<;!D0A54!78!#_!!)<A!)!4+0;45!78!*K@!!34)5!0-!
54+!?7(.%+!78!4+,!/7Q9



V = l i w i h

V = 9 i 8 i 6

V = 72 i 6

V = 432in³

Check

```
    72
6)432
! 42
   12
!  12
    0
```

72 Ö 8 = 9

!

3+ !N,*X!V(?0<!D)<5-!57!A+%0<+!47D!%.$4!0$+!05!5)B+-!57!80((!40-!$77(+,@!N4+!$77(+,!4)-!)!(+<;54!78!#M!0<$4+-I!D0A54!78!'#
78!'_!0<$4+-@!!G7D!%.$4!0$+!D0((!40-!$77(+,!47(A9

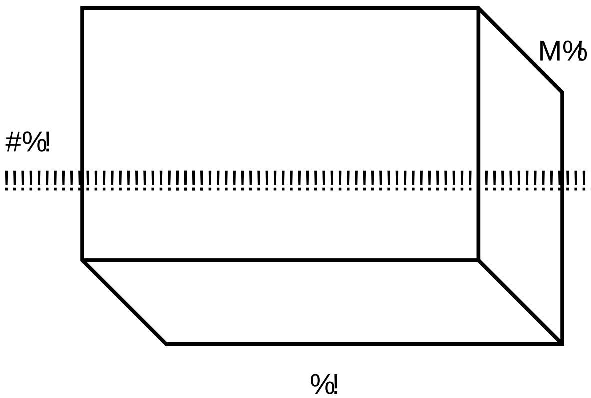
F7.!N,*X!R+/S-!677(!0-!0<!54+!-4)6+!78!)!,+$5)<;.(),!6,0-%@!!L5!45)!78!<!%+5+,-!)!D0A54!78!M!%+5+,-!)<A!)!4+0;45!78!#!%+5+,-0-!54+!%)Q0%.%!?7(.%+!78!D)5+,!54)5!R+/S-!677(!$)<!47(A9

!

!

!!!

!



!!! !

$V = B$! h

$V =$! !

$V =$!

$V =$ *me ers*

Check

4 ÷ 2 = 32

32 ÷ 4 =

! N4+!%)Q0%.%!?7(.%+!78!R+/S-!677(!0 $./0$!%+5+,-!78!D)5+,@

!

!

!

!

!

!

!

!

!

!

!

!

!

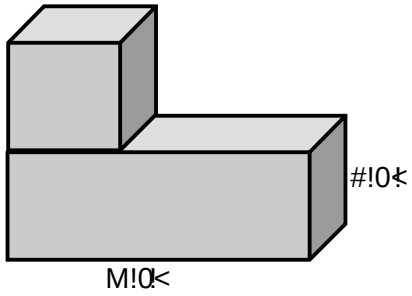
!

!

!

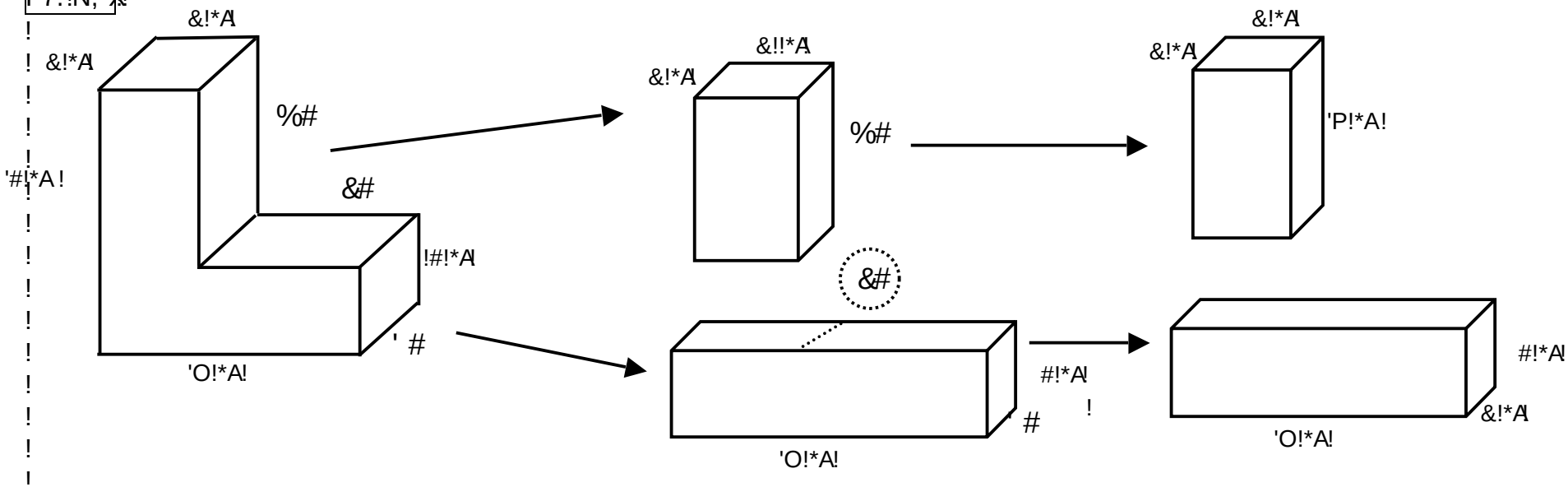
!

3+ !N,*X!



F7.!N,*X!!
&!*A!
!
!
&!*A!
!
!
!
'#!*A!
!
!
!#!*A!
!
!
!
'O!*A!
!
!
@#,+:)#./'5!!?#/B!)<+!G.$8>+!.D!)<+!:.>E.'#)+!D#68,+K
!
TQ)%6(!#!!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!

F7.!N,*X!



U7(.%+!78!f0;.,+!'!

V = l ! w! h

V = 3! 3! 10

V = 9! 10

V = 90yd^3

U7(.%+!78!f0;.,+!#

V = B ! h

V = (15! 3) ! 2

V = 45! 2

V = 90yd^3

Z.%!78!U7(.%+!-

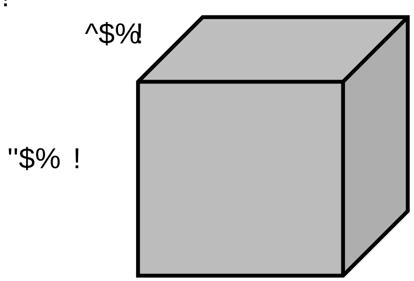
90yd + 90yd

= 180yd

! N4+!?7(.%+!78!54+!$7%67-05+!80;.,+!(
$./0$!*),A-@

1"+">+/) 5

g' !!!N40-!%0<0!80-4!5)<B0-A!40B+!)!,+$5)<;.(),!6,0-%@!!L5!0-!80((+A!57!54+!576!D054!D)5+,@!!30((!54+!/+)B+,!47(A!)((!78!54+!D
5)<B9!L8!<75I!4%D$4!%7,+!D)5+,!A7+-!54+!80-4!5)<B!47(A!54)<!54+!/+)B+,9!h.-508*!*7.,!)<-D+,=@!!1 2



g#!!V!;,7.6!78!-$0<50-5-!),+!+Q6+,0%+<50<;!D054!70(!)<A!D)5+,@!!N4+*!),+!.-0<;!)!,+$5)<;.(),!$7<5)0<+,!54)5!4)-!)!12in²)+78!4+0;45!78!8in @!
L5!0-!80((+A!D054!/754!70(!)<A!D)5+,@!N4+*!<750$+!54)5!54+!70(!5)<A-!7<!57()*+,-!D054!54+!70(!,0-0<;!57!54+!576!78!54+!$7<5)0<+,@!`-0<;!
0<87,%)507<!)<A!54+!-$0+<50-5-S!A0);,)%!/+(7D!A+5+,%0<+!D4)5!0-!54+!?7(.%+!!78!54+!D)5+,@!

1"+">+/)!1/'J+,'! !

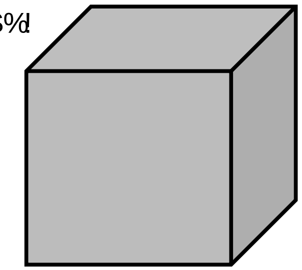
g' !!!N40-!%0<0!80-4!5)<B!0-!-4)6+A!(0B+!)(),+$5)<%@!!L5!0-!80((+A!57!54+!576!D054!D)5+,@!!30((!54+!/+)B+,!47(A!)((!78!54+!D)5 5)<B9!L8!<75I!47D!%7,+!D)5+,!A7+-!54+!80-4!5)<B!47(A!54)<!54+!/+)B+,9!h.-508*!*7.)!<-D+,@!!1 cm ml

!

!

^$%!

"$% !



'#!$%!

U7(.%+!78!f0-4!N)<! !!!`<05!E7<?+,-07< R088+<$+!0<!U7(.%+

$V = l ! w ! h$

$V =$! !

$V =$!

$V =$ cm

$1\text{cm}^3 = 1\text{ml}$

$1188\text{cm}^3 = 1188\text{ml}$

$1\text{L} = 1{,}000\text{ml}$

$= 1188ml ! 1000ml$

$= 188ml$

! N4+!/+)B+,!D0((!<75!47(A!)((!78!54+!D)5+,!8,7%!54+!80-4!5)<B!.

!

!

!

!

g# !!V!;,7.6!78!-$0+<50-5-!),+!+Q6+,0%+D55!54!70(!)<A!D)5+,@!!N4+*!),+!.-0<;!)!,+$5)<;.(),!$7<5)0<+,!54)5!4)-!)!/-+!),+)!78!12 in^2 !)<A!)!4+0;45!78!8 in @!! L5!0-!80((+A!D054!/754!70(!)<A!D)5+,@!N4+*!<750$+!54)5!54+!70(!)<A!D)5+,!-+6),)5+!0<57!54+!576!78!54+!$7<5)0<+,@!`-0<;!54 0<87,%)507<!)<A!54+!-$0+<50-5-S!A0);,)%!/+(7DI!A+5+,%0<+!D4)5!0-!54+!?7(.%+!78!54+!D)5+,@!

!

!

!

!

!

!

!

!

!

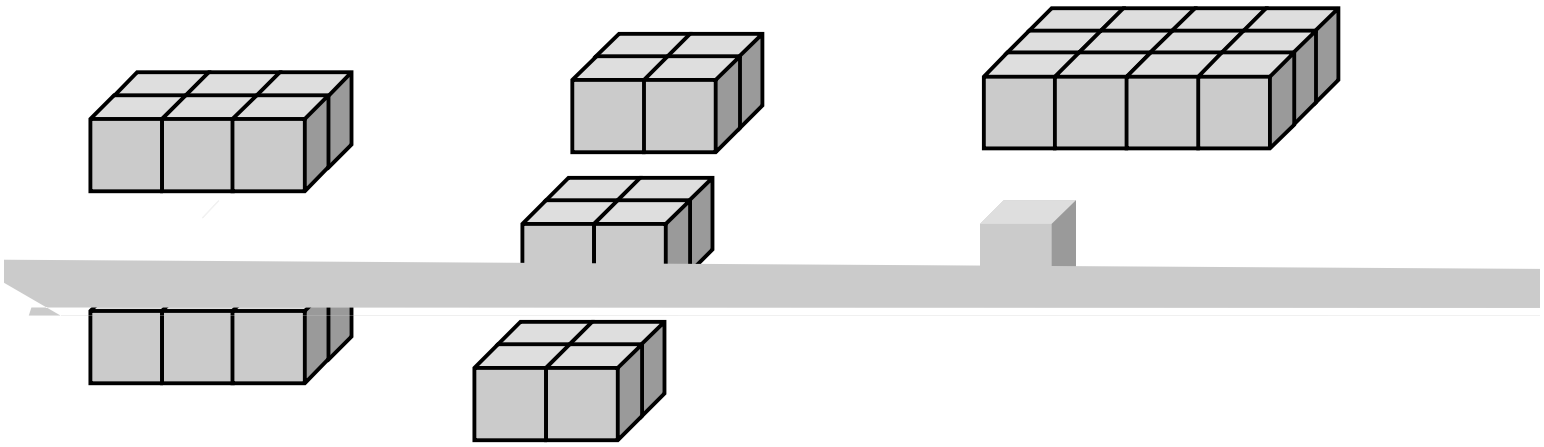
!

!

!

!

!"#$%&"'(%!)#(*%!+"/(0!1'.,2%(!'



!"#$%&"'(%!)#(*%!+'#&0"'*#3%!'***(copy 2x per student)***'