

A Changing Dimension's Effect on Perim Last

first

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1) Starting Dimensions & calculation of Perimeter	2) Doubling ALL dimensions & calculation of Perimeter
w = 2 cm L = 5 cm	w = 4 cm L = 10 cm
L = 3 cm	L = 6 cm
s₁ = 6 cm s₂ = 4 cm s₃ = 5 cm	s₁ = 12 cm s₂ = 8 cm s₃ = 10 cm
s = 1 cm	s = 2 cm
r = 1 cm	r = 2 cm

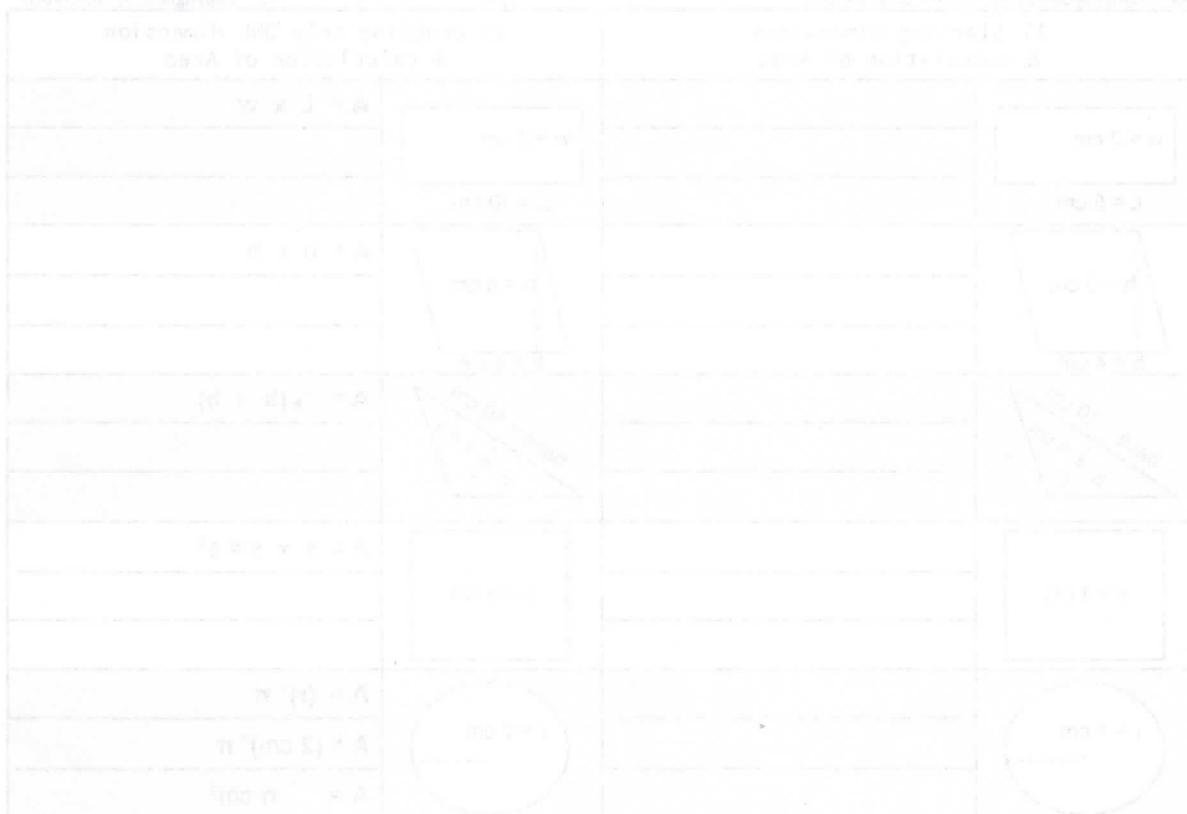
B Changing Dimension's Effect on Area Last

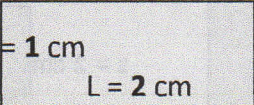
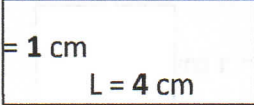
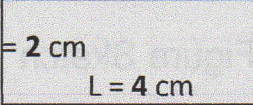
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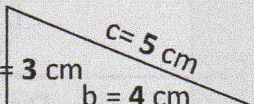
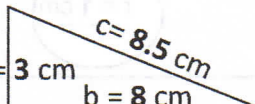
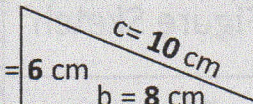
1) Starting Dimensions & calculation of Area	2) Doubling only ONE dimension & calculation of Area
w = 2 cm L = 5 cm	w = 2 cm L = 10 cm
b = 4 cm h = 6 cm	b = 8 cm h = 6 cm
base = 4 cm h = 10 cm	base = 8 cm h = 10 cm
s = 1 cm	s = 2 cm
r = 1 cm	r = 2 cm

1. What happens to the Area of a Rectangle when you double its Length or width?
a) Stays the same b) Doubles c) Cut in half
2. What happens to the Area of a Parallelogram when you double its Base or Height?
a) Stays the same b) Doubles c) Cut in half
3. What happens to the Area of a Triangle when you double its Base or Height?
a) Stays the same b) Doubles c) Cut in half
4. What happens to the Area of a Square when you double its side?
a) Stays the same b) Doubles c) Quadruples (4x bigger)
5. What happens to the Area of a Circle when you double its radius?
a) Stays the same b) Doubles c) Quadruples (4x bigger)
6. Using your B-side starting circle and scrap paper, what happens to Area when its radius is Tripled?
a) 3x bigger b) 9x bigger
7. Using your starting B-square and scrap paper, what happens to Area when its side is Tripled?
a) 3x bigger b) 9x bigger
8. Doubling or Tripling a Square's side or Circle's radius does NOT double or triple its Area, because:
a) The Area of a Square or Circle doesn't have anything squared
b) The Area of a Square or Circle involves Squaring the side or Squaring the radius!
9. What happens to the Area of a Rectangle when its Length or Width is cut in half?
a) Stays the same b) Doubles c) Cut in half
10. What happens to the Area of a Parallelogram when its Base or Height is cut in half?
a) Stays the same b) Doubles c) Cut in half
11. What happens to the Area of a Triangle when its Base or Height is cut in half?
a) Stays the same b) Doubles c) Cut in half
12. What happens to the Area of a Square when its side is $\frac{1}{2}$ the original? The Area is:
a) $\frac{1}{2}$ the size b) $\frac{1}{4}$ th the size
13. What happens to the Area of a Circle when its radius is $\frac{1}{2}$ the original? The Area is:
a) $\frac{1}{2}$ the size b) $\frac{1}{4}$ th the size
14. If a Circle's radius or Square's side is $\frac{1}{3}$ rd the original length, the Area will be:
a) $\frac{1}{3}$ rd b) $\frac{1}{6}$ th c) $\frac{1}{9}$ th of the original area

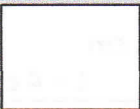
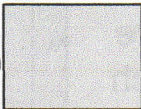


Dimension Action	Starting	Double Starting Length <u>OR</u> Width	Double BOTH Starting Length <u>AND</u> Width
Figure Sketch			
Perimeter [= 2L + 2w = 2(L + w)]		P = 2(4 cm + 1 cm) P = cm	
Area (= L x w)		A = 4 cm x 1 cm A = cm ²	

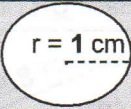
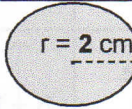
- When just the Length OR the Width (but not both) is doubled, the Perimeter: a) Doubles b) Less than doubles
- When BOTH the Length and the Width are doubled, the Perimeter also: a) Doubles b) Quadruples
- When just the Length OR the Width (but not both) is doubled, the Area: a) Doubles b) Less than doubles
- When BOTH the Length AND the Width are doubled, the Area: a) Doubles b) Quadruples
- By what factor is Perimeter increased when BOTH the Length and the Width are doubled? a) x2 b) x4 c) x½
- By what factor is Area increased when BOTH the Length and the Width are doubled? a) x2 b) x4 c) x½
- When BOTH the Length and the Width are halved, the Perimeter is also: a) Halved b) Quartered
- By what factor is Perimeter decreased when BOTH the Length and the Width are halved? a) x½ b) x¼
- When BOTH the Length and the Width are halved, the Area is: a) Halved b) Quartered
- By what factor is Area decreased when BOTH the Length and the Width are halved? a) x½ b) x¼

Dimension Action	Starting	Double Starting Base <u>OR</u> Height	Double BOTH Starting Length <u>AND</u> Width
Figure Sketch			
Perimeter [= S ₁ + S ₂ + S ₃]		P = 3 cm + 8 cm + 8.5 cm P = cm	
Area (= ½ b x h)		A = ½ 8 cm x 3 cm A = cm ²	

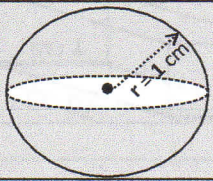
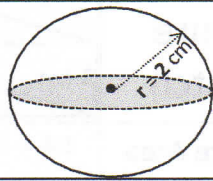
- When just the Base OR the Height (but not both) is doubled, the Perimeter: a) Doubles b) Less than doubles
- When BOTH the Base and the Height are doubled, the Perimeter: a) Doubles b) Less than doubles
- When just the Base OR the Height (but not both) is doubled, the Area: a) Doubles b) Less than doubles
- By what factor is Area increased when just the Base or the Height (but not both) is doubled? a) x2 b) x4 c) x½
- When BOTH the Base and the Height are doubled, the Area: a) Doubles b) Triples c) Quadruples
- By what factor is Area increased when BOTH the Base and the Height are doubled? a) x2 b) x3 c) x4
- When just the Base OR the Height (but not both) is halved, the Area is: a) Halved b) Quartered
- By what factor is Area decreased when just the Base or the Height (but not both) is halved? a) x½ b) x¼
- When BOTH the Base and the Height are halved, the Area is: a) Halved b) Quartered
- By what factor is Area decreased when BOTH the Base and the Height are halved? a) x½ b) x¼

Dimension Action	Starting	Double the Side
Figure Sketch	s = 1 cm 	s = 2 cm 
Perimeter (= s + s + s + s = 4s)		P = 4 x 2 cm
		P = _____ cm
Area (= s x s = s ²)		A = 2 cm x 2 cm
		A = _____ cm ²

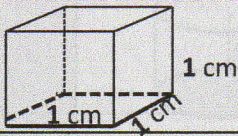
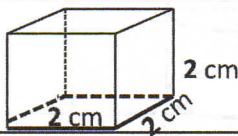
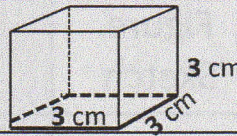
- When the side of a square is doubled, the Perimeter: a)Quadruples b)Doubles
- By what factor is Perimeter increased when a side is doubled? a)x2 b)x4 c)x½
- When the side is doubled, the Area actually: a)Triples b)Doubles c)Quadruples
- By what factor is the Area increased when a side is doubled? a)x2 b)x4 c)x½
- When the side of a square is halved, the Perimeter is: a)Halved b)Doubled
- By what factor is Perimeter decreased when a side is halved? a)x2 b)x4 c)x½
- When the side of a square is halved, the Area is: a)Halved b)Quartered c)Doubled
- By what factor is Area decreased when a side is halved? a)x2 b)x4 c)x½ d)x¼
- Now, using scrap-paper, tripling (x3), a side increases its Area by a factor of: a)x3 b)x6 c)x9
- Now, using scrap-paper, quadrupling (x4), a side increases its Area by a factor of: a)x4 b)x8 c)x16

Dimension Action	Starting	Double the Radius
Figure Sketch	r = 1 cm 	r = 2 cm 
Diameter (= 2r)		D = 2 x 2 cm
		D = _____ cm
Circumference (= Dπ)		C = 4 cm x π
		C = _____ π cm
Area (= r ² π)		A = (2 cm x 2 cm) π
		A = _____ π cm ²

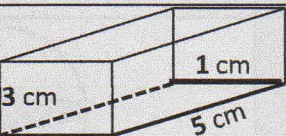
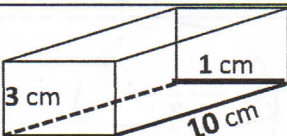
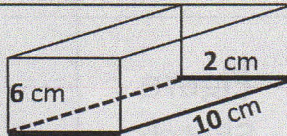
- When the radius is doubled, the Diameter & Circumference: a)Triples b)Doubles
- By what factor are Diameter & Circumference increased when the radius is doubled? a)x2 b)x4 c)x½
- When the radius is doubled, the Area actually: a)Triples b)Doubles c)Quadruples
- By what factor is the Area increased when the radius is doubled? a)x2 b)x4 c)x½
- By what factor are Diameter & Circumference decreased when the radius halved? a)x2 b)x4 c)x½
- When the radius is halved, the Area is actually reduced to: a)one-half its size b)one-quarter its size
- By what factor is the Area reduced when the radius is halved? a)x2 b)x4 c)x½ d)x¼
- Doubling the radius: a)Doubles b)Triples c)Quadruples the Area of a Circle
- Halving the radius: a)Halves b)Thirds c)Quarters the Area of a Circle
- By what factor would Area increase if radius were tripled (x3)? a)x3 b)x6 c)x9

Dimension Action	Starting	Double the Radius (r)
Figure Sketch		
Surface Area (= $4r^2\pi$)	$SA = 4(1\text{cm})^2\pi$	
	$SA = \pi \text{ cm}^2$	
Volume (= $(4/3)r^3\pi$)	$V = 4/3(1\text{cm})^3\pi$	
	$V = \pi \text{ cm}^3$	

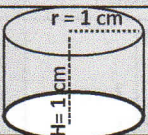
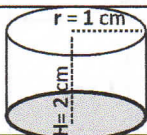
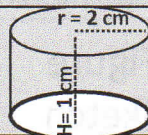
- When the radius is doubled, the Surface Area: a) Triples b) Doubles c) Quadruples
- By what factor does the Surface Area increase when the radius is doubled? a) x2 b) x4 c) x½
- When the radius is halved, the Surface Area is: a) Halved b) Quartered
- By what factor does the Surface Area decrease when the radius is halved? a) x½ b) x¼
- When the radius is doubled, the Volume actually: a) Doubles b) Quadruples c) Octuples
- By what factor is the Volume increased when the radius is doubled? a) x2 b) x4 c) x8
- When the radius is halved, the Volume is reduced to: a) one-eighth its size b) one-quarter its size
- By what factor does the Volume decrease when the radius is halved? a) x½ b) x¼
- Doubling the radius enlarges Volume 8x. Tripling radius would enlarge Volume: a) 12x b) 27x
- Doubling radius enlarges Volume 8x; tripling enlarges it 27x; Quadrupling radius enlarges Volume x _____

Dimension Action	Starting	Double Side	Triple Side
Figure Sketch			
Surface Area 6 x Area of one Face = $6(s^2)$	$SA = 6 \times (1 \text{ cm})^2$		
	$SA = \text{cm}^2$		
Volume = $BA \times H$ = $(s \times s) \times s = s^3$	$V = (1\text{cm})^3$		
	$V = \text{cm}^3$		

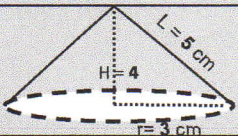
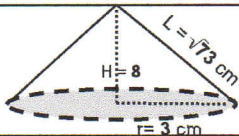
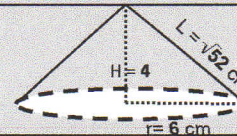
- When the Side of a Cube is doubled, the Surface Area: a) Doubles b) Quadruples
- By what factor is Surface Area increased when the side is doubled? a) x½ b) x2 c) x4
- When the Side of a Cube is tripled, the Surface Area is: a) 6 times more b) 9 times more
- By what factor is Surface Area increased when the side is tripled? a) x½ b) x6 c) x9
- When the Side of a Cube is doubled, the Volume: a) Doubles b) Quadruples c) "Octuples"
- By what factor is Volume increased when the side is doubled? a) x½ b) x2 c) x8
- When the Side of a Cube is tripled, the Volume is: a) 27 times bigger b) Tripled
- By what factor is Volume increased when the side is tripled? a) x3 b) x6 c) x9 d) x27
- When the Side of a Cube is halved, the Surface Area is decreased by a factor of: a) x½ b) x¼
- When the Side of a Cube is halved, the Volume is decreased by a factor of: a) x½ b) x¼ c) x½

Dimension Action	Starting	Double only 1 Side	Double ALL 3 dimensions
Figure Sketch			
Surface Area 2 x Front + 2 x Side + 2 x Floor	$SA = 2(3\text{cm}) + 2(15\text{cm}) + 2(5\text{cm})$ $SA = \quad \text{cm}^2$		
Volume = BA x H = L x w x h	$V = 5\text{cm} \times 1\text{cm} \times 3\text{cm}$ $V = \quad \text{cm}^3$		

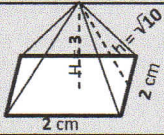
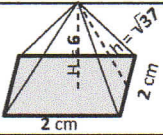
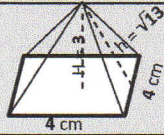
- When one side of a Rectangular Prism is doubled, the Surface Area: a) Doubles b) Less than Doubles
- By what factor does the Surface Area increase when just one side is doubled? a) $\times \frac{1}{2}$ b) $\times < 2$ c) $\times 4$
- When ALL 3 sides of a Rectangular Prism are doubled, the Surface Area: a) Doubles b) Quadruples
- By what factor does the Surface Area increase when ALL 3 sides are doubled? a) $\times \frac{1}{2}$ b) $\times < 2$ c) $\times 4$
- When one side of a Rectangular Prism is doubled, the Volume: a) Doubles b) Triples
- By what factor does the Volume increase when just one side is doubled? a) $\times \frac{1}{2}$ b) $\times 2$ c) $\times 4$
- When ALL 3 sides of a Rectangular Prism are doubled, the Volume is: a) Quadrupled b) Octupled
- By what factor does the Volume increase when ALL 3 sides are doubled? a) $\times \frac{1}{2}$ b) $\times 4$ c) $\times 8$
- When ALL 3 Sides of a Rectangular Prism are halved, the Surface Area is: a) $\frac{1}{2}$ what it was b) $\frac{1}{4}$ what it was
- When ALL 3 Sides of a Rectangular Prism are halved, the Volume is: a) $\frac{1}{4}$ what it was b) $\frac{1}{8}$ what it was

Dimension Action	Starting	Double just HEIGHT (H)	Double just RADIUS (r)
Figure Sketch			
Surface Area $2(r^2\pi) + D\pi(H)$	$SA = 2 \times (1\text{cm})^2 \pi + 2\pi\text{cm} \times 1\text{cm}$ $SA = \quad \pi \text{ cm}^2$		
Volume = BA x H = $r^2\pi \times H$	$V = (1\text{cm})^2 \pi \times 1\text{cm}$ $V = \quad \pi \text{ cm}^3$		

- When just the Height is doubled, the Surface Area: a) Doubles b) Less than Doubles
- When just the Radius is doubled, the Surface Area: a) Doubles b) More than Doubles
- When just the Height is doubled, the Volume: a) Doubles b) Less than Doubles
- By what factor does the Volume increase when just the Height is doubled? a) $\times \frac{1}{2}$ b) $\times 2$ c) $\times 4$
- When just the Radius is doubled, the Volume: a) Doubles b) Quadruples
- By what factor does the Volume increase when just the Radius is doubled? a) $\times \frac{1}{2}$ b) $\times 2$ c) $\times 4$
- If you want a can of Mountain Dew to hold the most soda, you should: a) Double its Height b) Double its Radius
- If you want your swimming pool to hold the most water, you should: a) Double its Height b) Double its Radius
- But if you just want your swimming pool to be DEEPER, then you should double its: a) Height b) Radius
- Using scrap-paper, by what factor does Volume increase if you double BOTH radius AND Height? a) $\times 6$ b) $\times 8$

Dimension Action	Starting	Double just HEIGHT (H)	Double just RADIUS (r)
Figure Sketch			
Surface Area $r^2\pi + \pi rL$	$SA = (3\text{cm})^2 \pi + \pi(3\text{cm} \times 5\text{cm})$		
	$SA = \pi \text{ cm}^2$		
Volume $= \frac{1}{3} (BA \times H)$ $= \frac{1}{3} (r^2\pi \times H)$	$V = \frac{1}{3} [(3\text{cm})^2\pi] \times 4\text{cm}$		
	$V = \pi \text{ cm}^3$		

- When Height is doubled, the Surface Area: a)Doubles b)Less than Doubles
- When Radius is doubled, the Surface Area: a)Less than Doubles b)More than Doubles
- When Height is doubled, the Volume: a)Doubles b)Less than Doubles
- By what factor does the Volume increase when Height is doubled? a) $\times\frac{1}{2}$ b) $\times 2$ c) $\times 4$
- When Radius is doubled, the Volume: a)Doubles b)Quadruples
- By what factor does the Volume increase when Radius is doubled? a) $\times\frac{1}{2}$ b) $\times 2$ c) $\times 4$
- If you want an ice cream cone that hold the most ice cream, you should double its: a)Height b)Radius
- If you want a megaphone (loudspeaker) to carry more of your voice, you should double its: a)Height b)Radius
- But if you just want your cone-shaped swimming pool to be DEEPER, then double its: a)Height b)Radius
- Using scrap-paper, by what factor does Volume increase if you double BOTH Radius AND Height? a) $\times 6$ b) $\times 8$

Dimension Action	Starting	Double just HEIGHT (H)	Double Square Sides
Figure Sketch			
Surface Area $= s^2 + (4 \times \frac{1}{2}bh)$	$SA = (2\text{ cm})^2 + 4 \times (\frac{1}{2} 2\text{cm} \times \sqrt{10}\text{ cm})$		
	$SA = \text{cm}^2$		
Volume $= \frac{1}{3} (BA \times H)$ $= \frac{1}{3} (s^2 \times H)$	$V = \frac{1}{3} (2\text{ cm})^2 \times 3\text{ cm}$		
	$V = \text{cm}^3$		

- When Square Pyramid Height is doubled, the Surface Area: a)Doubles b)Less than Doubles
- When square base Side is doubled, the Surface Area: a)Less than Doubles b)More than Doubles
- When Square Pyramid Height is doubled, the Volume: a)Doubles b)Less than Doubles
- By what factor does the Volume increase when Pyramid Height is doubled? a) $\times\frac{1}{2}$ b) $\times 2$ c) $\times 4$
- When square base Side is doubled, the Volume: a)Doubles b)Quadruples
- By what factor does the Volume increase when square base Side is doubled? a) $\times\frac{1}{2}$ b) $\times 2$ c) $\times 4$
- If you want your Square Pyramid to hold the most gold, you should double its: a)Height b)Base Sides
- If you want to fill your Square Pyramid w/ the most Mtn. Dew, you should double its: a)Height b)Base Sides
- But if you want your Square Pyramid to be the TALLEST in the kingdom, then double its: a)Height b)Base Sides
- Using scrap-paper, by what factor does Volume increase if you double BOTH Height AND Sides? a) $\times 6$ b) $\times 8$