Name:

Exam Style Questions

Surface Area of a Cone

Corbettmaths

Equipment needed: Pen and Calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

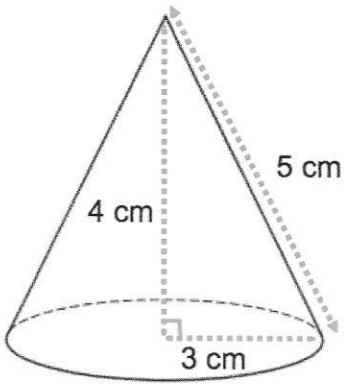
Video Tutorial

www.corbettmaths.com/contents

Video 314

Answers and Video Solutions

1. A cone has base radius 3cm, perpendicular height 4cm and slant height 5cm.



Work out the surface area of the cone.

$SA = \pi r^2 + \pi rl$

$= (\pi \times 3^2) + (\pi \times 3 \times 5)$

$= 75.39822...$

or 24π

75.398 ..... cm^2

(3)

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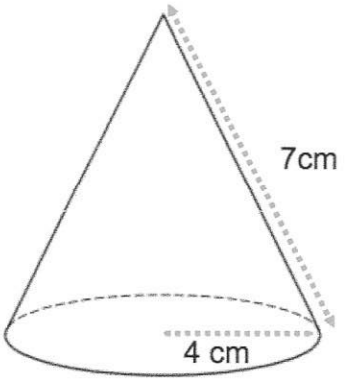
2. A cone has base radius 4cm and slant height 7cm.



Work out the surface area of the cone.

$SA = \pi r^2 + \pi rl$

$= (\pi \times 4^2) + (\pi \times 4 \times 7)$

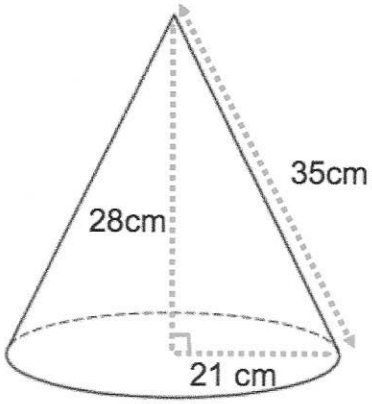
$= 138.23007768$

or 44π

138.23 ..... cm^2

(3)

3. A cone has base radius 21cm, perpendicular height 28cm and slant height 35cm.



Work out the surface area of the cone.

$SA = \pi r^2 + \pi r l$

$= (\pi \times 21^2) + (\pi \times 21 \times 35)$

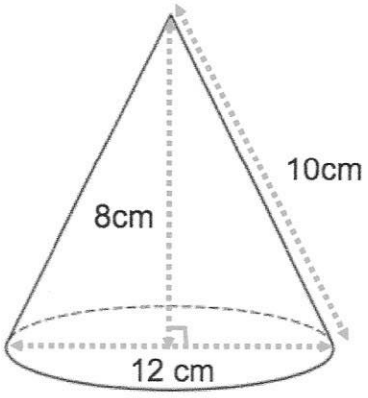
$= 3694.512961$

or 1176π

3694.5 .....cm²

(3)

4. A cone has base diameter 12cm, perpendicular height 8cm and slant height 10cm.



Work out the surface area of the cone.

$SA = \pi r^2 + \pi r l$

$= (\pi \times 6^2) + (\pi \times 6 \times 10)$

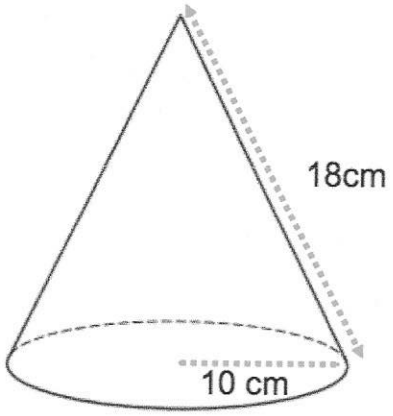
$= 301.592894\ 7$

or 96π

301.593 .....cm²

(3)

5. A cone has base radius 10cm and slant height 18cm.



Work out the surface area of the cone.
Give your answer in terms of π

$SA = \pi r^2 + \pi r l$

$= (\pi \times 10^2) + (\pi \times 10 \times 18)$

$= 100\pi + 180\pi$

$= 280\pi$

280π .....cm^2

(3)

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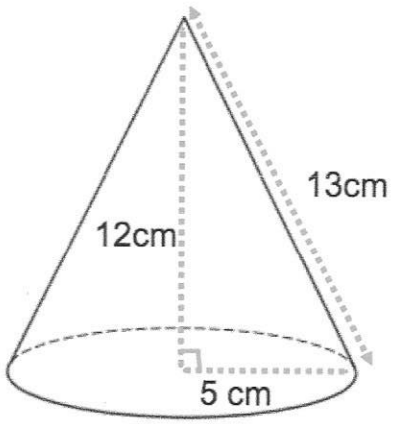
6. A cone has base radius 5cm, perpendicular height 12cm and slant height 13cm.



Work out the surface area of the cone.
Give your answer in terms of π

$SA = \pi r^2 + \pi r l$

$= (\pi \times 5^2) + (\pi \times 5 \times 13)$

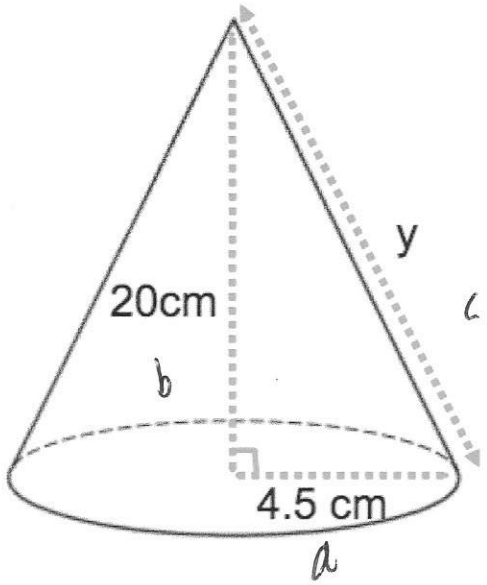
$= 282.7433388$

or $= 90\pi$

90π .....cm^2

(3)

7. The diagram shows a cone.
The vertical height is 20cm.
The radius of the base is 4.5cm.
The slant height is y



(a) Work out the value of y.

$a^2 + b^2 = c^2$

$4.5^2 + 20^2 = y^2$

$y^2 = 420.25$

$y = 20.5$

20.5 .....cm

(3)

(b) Work out the surface area of the cone.
Give your answer to one decimal place.

$SA = \pi r^2 + \pi \cdot l$

$= (\pi \times 4.5^2) + (\pi \times 4.5 \times 20.5)$

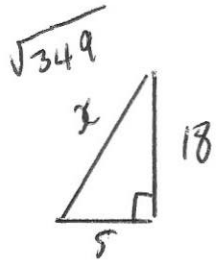
$= 353.42917..$

353.4 .....cm²

(3)

8. A cone has base diameter 10cm.
The height of the cone is 18cm.

Calculate the surface area of the cone.



$x^2 = 5^2 + 18^2$

$= 349$

$x = \sqrt{349}$

$SA = \pi r^2 + \pi r l$

$= (\pi \times 5^2) + (\pi \times 5 \times \sqrt{349})$

$= 371.99 cm^2$ to 2dp

371.99 .....cm²

(4)

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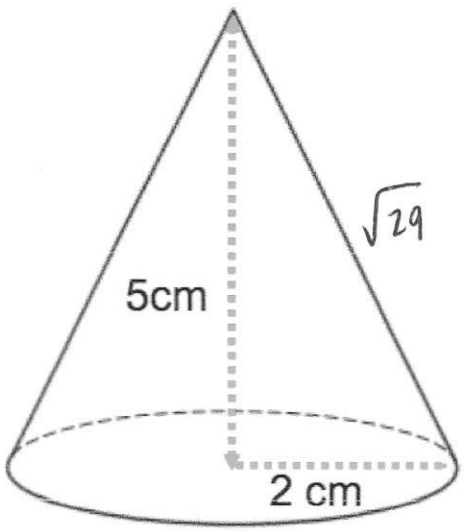
9. A cone has base of radius 2cm.
The perpendicular height of the cone is 5cm.



$x^2 = 2^2 + 5^2$

$x^2 = 29$

$x = \sqrt{29}$

Calculate the surface area of the cone.

$SA = \pi r^2 + \pi r l$

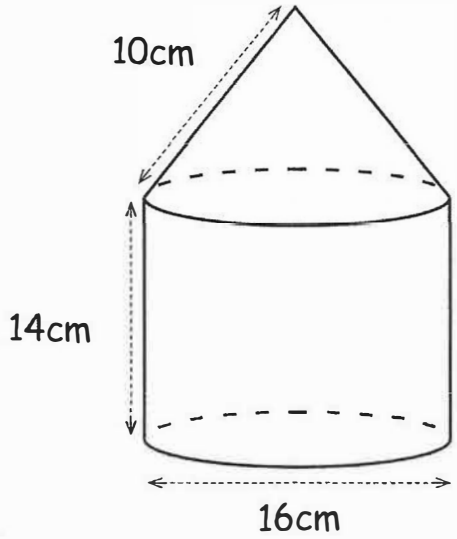
$= (\pi \times 2^2) + (\pi \times 2 \times \sqrt{29})$

$= 46.40235...$

46.4 .....cm²

(4)

10. Jonathan made a solid wooden model by joining a cylinder and a cone.



Find the total surface area of the wooden model.

Base : $\pi \times 8^2 = 64\pi$ (or 201.0619...)

Curved face of cylinder : $\pi \times 16 \times 14 = 224\pi$ (or 703.716...)

top : $\pi \times 8 \times 10 = 80\pi$ (251.327...)

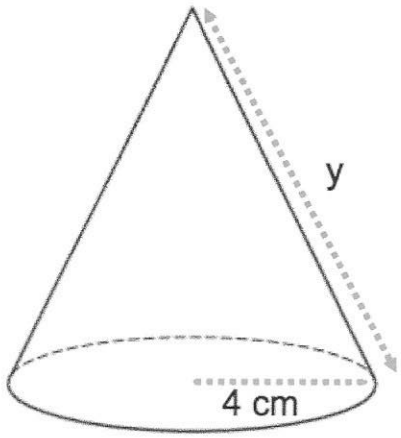
total SA $= 368\pi$

$= 1156.106097$

1156.1 ..... cm^2

(4)

11. Shown below is a cone.
The base has a radius of 4 cm.
The slant height is y cm.



The total surface area of the cone is 48π cm²

Calculate y.

$SA = \pi r^2 + \pi r l$

$48\pi = (\pi \times 4^2) + (\pi \times 4 \times y)$

$48\pi = 16\pi + 4\pi y$

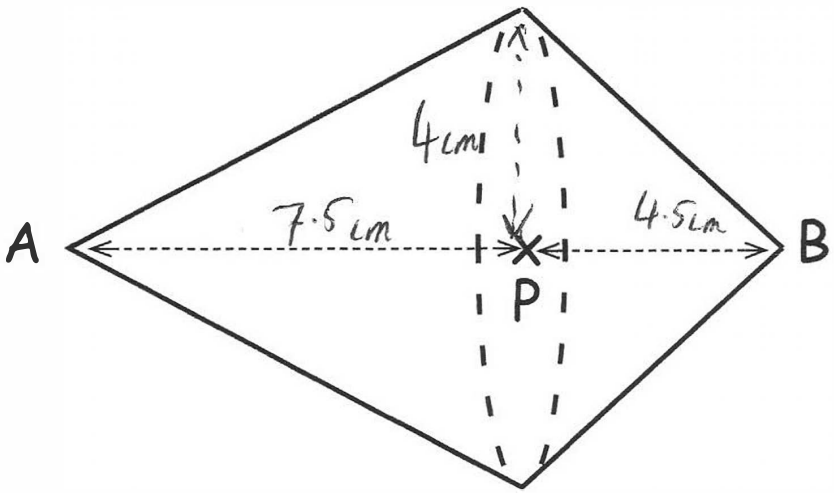
$32\pi = 4\pi y$

$4y = 32$

$y = 8$

8 .....cm
(3)

12. Two cones, each with a base radius of 4cm, are joined together to make the solid shape below.



AP : BP = 5 : 3 where

AP is the perpendicular height of the larger cone.
BP is the perpendicular height of the smaller cone.

Given AB = 12cm

Find the total surface area of the shape.

5+3 = 8

12 ÷ 8 = 1.5

AP : 1.5 x 5 = 7.5 cm

BP : 1.5 x 3 = 4.5 cm

Using Pythagoras, the slant height of the larger cone is 8.5cm

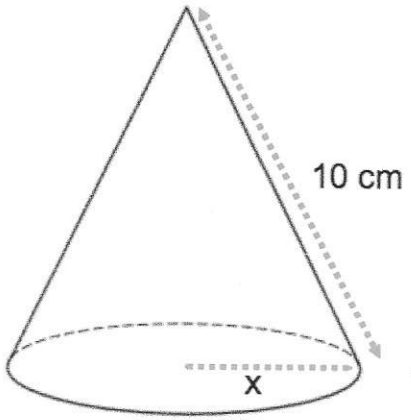
Using Pythagoras, the slant height of the smaller cone is 6.020797289...cm

$\pi \times 4 \times 8.5 + \pi \times 4 \times 6.020797...$

$= 182.4737...\ cm^2$

..cm²
(5)

13. Shown below is a cone.
The base has a radius of x cm.
The slant height is 10 cm.



The total surface area of the cone is 39π cm²

(a) Show $x^2 + 10x - 39 = 0$

$SA = \pi r^2 + \pi r l$

$39\pi = \pi x^2 + \pi \times x \times 10$

$39\pi = \pi x^2 + 10\pi x$

$39 = x^2 + 10x$

$0 = x^2 + 10x - 39$ **(3)**

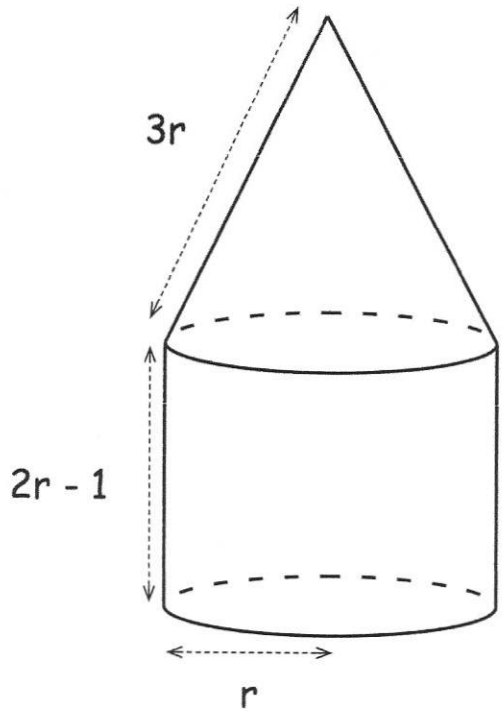
(b) Hence, find the length of the radius.

$(x + 13)(x - 3) = 0$

$x = -13$ ✗ $x = 3$ ✓

3 .....cm **(2)**

14. A cone and cylinder are joined to make a solid shape.



Show the total surface area of the solid shape is $2\pi r(4r - 1)$

Base : πr^2

Curved face of cylinder : $\pi \times 2r \times (2r - 1)$

$= 2\pi r(2r - 1)$

$= 4\pi r^2 - 2\pi r$

top : $\pi \times r \times 3r$

$= 3\pi r^2$

total : $\pi r^2 + 3\pi r^2 + (4\pi r^2 - 2\pi r)$

$: 8\pi r^2 - 2\pi r$

$2\pi r(4r - 1)$ QED

(4)