# Higher Check In – 3.03 Exact calculations

**Do not use a calculator.**

1. Simplify 
2. Find the exact area of a semicircle with a diameter of 8 m.
3. Simplify 
4. The lengths of the diagonals of a kite are cm and cm. Work out the exact area of the kite.
5. Rationalise and simplify .
6. Show that the area of this rectangle is a prime number.

cm

cm

**Not to scale**

1. A circle has area cm2. Show that the circumference of this circle is cm2.
2. The area of a square is 48 cm2. Show that length of a diagonal of the square is

cm.

1. A rectangle has area 12 m2. The length of the rectangle is m. Find the exact width of the rectangle, giving your answer in the form 
2. A cylinder made of solid brass has diameter 6 cm and height 8 cm. The cylinder is melted down and made into a new cylinder with height 6 cm. What is the exact diameter of the new cylinder?

**Extension**

Solve these simultaneous equations.



## Answers

1. 
2. m2
3. 
4. cm
5. 
6.  which is prime.
7. For a circle, area  so  which gives  so .

Since circumference  then circumference .

1. If area  then each side has 

By Pythagoras’ theorem, the diagonal has length:

cm.

1. 
2.  cm

**Extension**

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AO1 | 1 | Simplify a surd |  |  |  |  | AO1 | 1 | Simplify a surd |  |  |  |
| AO1 | 2 | Use multiples of  in an exact calculation of the area of a semicircle |  |  |  |  | AO1 | 2 | Use multiples of  in an exact calculation of the area of a semicircle |  |  |  |
| AO1 | 3 | Simplify an expression containing surds |  |  |  |  | AO1 | 3 | Simplify an expression containing surds |  |  |  |
| AO1 | 4 | Use surds in an exact calculation of the area of a kite |  |  |  |  | AO1 | 4 | Use surds in an exact calculation of the area of a kite |  |  |  |
| AO1 | 5 | Simplify an expression with surds, including rationalising the denominator |  |  |  |  | AO1 | 5 | Simplify an expression with surds, including rationalising the denominator |  |  |  |
| AO2 | 6 | Use surds in an exact area calculation of the area of a rectangle |  |  |  |  | AO2 | 6 | Use surds in an exact area calculation of the area of a rectangle |  |  |  |
| AO2 | 7 | Use multiples of  in an exact calculation of the circumference of a circle from the area of a circle |  |  |  |  | AO2 | 7 | Use multiples of  in an exact calculation of the circumference of a circle from the area of a circle |  |  |  |
| AO2 | 8 | Use surds in an exact calculation of a diagonal of a square |  |  |  |  | AO2 | 8 | Use surds in an exact calculation of a diagonal of a square |  |  |  |
| AO3 | 9 | Use surds in an exact calculation of a length of a rectangle |  |  |  |  | AO3 | 9 | Use surds in an exact calculation of a length of a rectangle |  |  |  |
| AO3 | 10 | Solve a volume problem using multiples of  and surds |  |  |  |  | AO3 | 10 | Solve a volume problem using multiples of  and surds |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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