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Additional Materials: Geometrical instruments

The total of the points for this paper is 70.

Formula List

For the equation

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Lateral surface area, A , of cylinder of radius r , height h .

$$A = 2\pi rh$$

Lateral surface area, A , of cone of radius r , sloping edge l .

$$A = \pi rl$$

Surface area, A , of sphere of radius r .

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

Volume, V , of pyramid, base area A , height h .

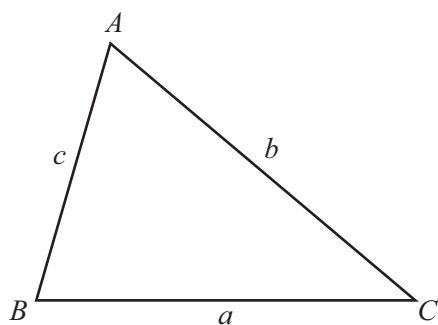
$$V = \frac{1}{3}Ah$$

Volume, V , of cone of radius r , height h .

$$V = \frac{1}{3}\pi r^2 h$$

Volume, V , of sphere of radius r .

$$V = \frac{4}{3}\pi r^3$$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}bc \sin A$$

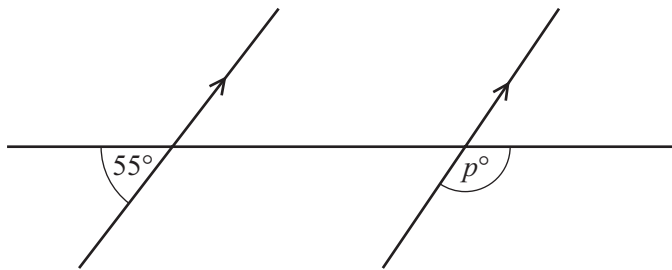
- 1 Work out 72 cents as a percentage of 90 cents.

Answer % [1]

- 2 Work out $\frac{1.2 - 0.7}{1.1 - 0.9}$.

Answer [2]

3



NOT TO
SCALE

Find the value of p .

Answer $p =$ [2]

- 4 Work out 17% of 40 kg.

Answer kg [2]

- 5 Solve the equation.

$$5 - 2x = 3x - 19$$

Answer $x =$ [2]

6

S P A C E S

One of the 6 letters is taken at random.

- (a) Write down the probability that the letter is S.

Answer(a) [1]

- (b) The letter is replaced and again a letter is taken at random.
This is repeated 600 times.

How many times would you expect the letter to be S?

Answer(b) [1]

- 7 Work out $1.1 \times 10^{13} - 2 \times 10^{12}$.
Give your answer in scientific notation.

Answer [2]

- 8 Write down the amplitude and the period of the function $f(x) = 3\sin 3x$.

Answer amplitude =

period = [2]

- 9 Emily invests \$ x at a rate of 4% per year simple interest.
After 5 years she has \$26 interest.

Find the value of x .

Answer $x =$ [3]

- 10 Find the n th term in each of the following sequences.

(a) $\frac{1}{3}, \frac{2}{4}, \frac{3}{5}, \frac{4}{6}, \frac{5}{7}, \dots$

Answer(a) [1]

(b) 0, 3, 8, 15, 24,

Answer(b) [2]

- 11 Solve for b .

$$c = \sqrt{a^2 + b^2}$$

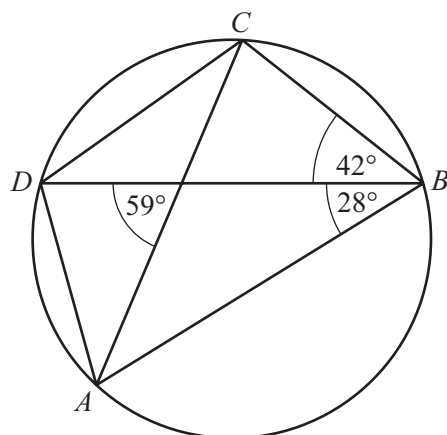
Answer $b =$ [3]

- 12 The surface area of a child's model car is 200 cm^2 .
The surface area of the full size car is 32 m^2 .

Find the scale of the model in the form $1 : n$.

Answer 1 : [3]

13



NOT TO
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A , B , C and D lie on the circle.

Find

(a) angle ADC ,

Answer(a) Angle ADC = [1]

(b) angle ACB .

Answer(b) Angle ACB = [2]

14 (a) $3^x = \sqrt[4]{3^5}$

Find the value of x .

Answer(a) x = [1]

(b) Simplify $(32y^{15})^{\frac{2}{5}}$.

Answer(b) [2]

15 Write as a single fraction in simplest form.

$$3 - \frac{t+2}{t-1}$$

Answer [3]

16 Work out, giving each answer as a fraction in lowest terms.

(a) $\frac{3}{4} - \frac{1}{12}$

Answer(a) [2]

(b) $2\frac{1}{2} \times \frac{4}{25}$

Answer(b) [2]

17



NOT TO
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A is the point $(-1, 1)$ and B is the point $(7, 7)$.

(a) Write \vec{AB} as a column vector.

$$\text{Answer(a)} \quad \vec{AB} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b) Find $|\vec{AB}|$.

$$\text{Answer(b)} \quad |\vec{AB}| = \dots\dots\dots [2]$$

(c) $\vec{AC} = 2\vec{AB}$.

Write down the co-ordinates of C .

$$\text{Answer(c)} \quad (\dots\dots\dots, \dots\dots\dots) \quad [1]$$

18 Factor completely.

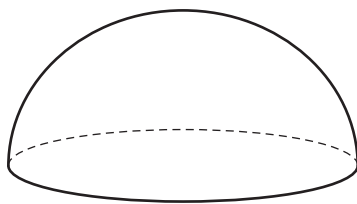
(a) $a + b + at + bt$

$$\text{Answer(a)} \quad \dots\dots\dots [2]$$

(b) $x^2 - 2x - 24$

$$\text{Answer(b)} \quad \dots\dots\dots [2]$$

- 19 The diagram shows a solid hemisphere.



The **total** surface area of this hemisphere is 243π .

The volume of the hemisphere is $k\pi$.

Find the value of k .

Answer $k =$ [4]

- 20 (a) Convert 72 km/h into meters per second.

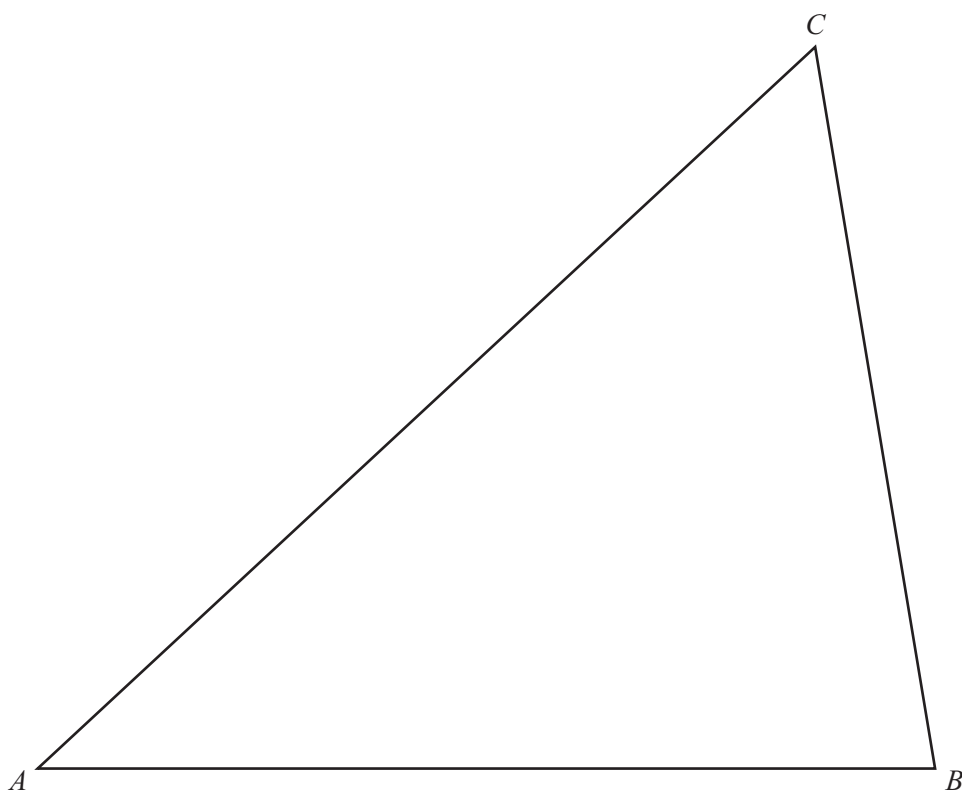
Answer(a) m/s [2]

- (b) A train of length 120 m is traveling at 72 km/h.
It passes under a bridge of width 20 m.

Find the time taken for the whole train to pass under the bridge.
Give your answer in seconds.

Answer(b) s [2]

21



In this question, use a straight edge and compass only and show your construction arcs.

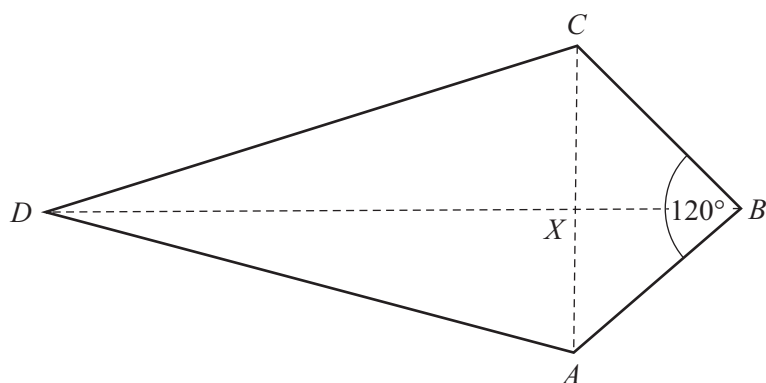
Construct accurately

(a) the bisector of angle B , [2]

(b) the perpendicular bisector of BC . [2]

11

22



NOT TO
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$ABCD$ is a kite.
The diagonals AC and BD intersect at X .
 $AC = 12$ cm, $BD = 25$ cm and angle $ABC = 120^\circ$.

(a) Work out the area of the kite.

Answer(a) cm² [2]

(b) Find the length of BX in simplest form.

Answer(b) cm [3]

Question 23 is printed on the next page.

- 23 There are 11 cars in a car park.
4 of the cars are red.

(a) Alex chooses two cars at random.

Find the probability that one car is red and one car is not red.

Answer(a) [3]

(b) Beth chooses cars at random from the 11 cars until a red car is chosen.

Find the probability that her 3rd choice is the first red car chosen.

Answer(b) [2]

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