

Question Number	Scheme	Marks
9.	<p>(a) <math>\angle ABC = 90^\circ</math>  <math>\cos 30 = \frac{BC}{12}</math> or <math>\sin 60 = \frac{BC}{12}</math>  <math>BC = 12 \cos 30 = 6\sqrt{3}</math> cm or <math>BC = 12 \sin 60 = 6\sqrt{3}</math> cm</p> <p>(b) <math>\sin 30 = \frac{BP}{6\sqrt{3}}</math>  <math>\Rightarrow BP = 6\sqrt{3} \sin 30 = 6\sqrt{3} \times \frac{1}{2} = 3\sqrt{3}</math> cm</p> <p>(c) <math>\tan 25 = \frac{3\sqrt{3}}{BF}</math> or <math>\tan 65 = \frac{BF}{3\sqrt{3}}</math>  <math>\Rightarrow BF = \frac{3\sqrt{3}}{\tan 25}</math> or <math>BF = 3\sqrt{3} \tan 65</math>  <math>\Rightarrow BF = 11.1</math> cm (3SF)</p> <p>(d) <math>BD^2 = (3\sqrt{3} \tan 65)^2 + (6\sqrt{3})^2</math> or <math>DP^2 = (3\sqrt{3} \tan 65)^2 + (3\sqrt{3} \tan 60)^2</math>  <math>BD = \sqrt{232.17} = 15.24</math> or <math>DP = \sqrt{205.2} = 14.32</math>  <math>\sin BDP = \frac{3\sqrt{3}}{15.24}</math> or <math>\tan BDP = \frac{3\sqrt{3}}{14.32}</math>  <math>\angle BDP = 19.9^\circ</math></p> <p>(e) Volume <math>= \frac{1}{2} \times 12 \times 3\sqrt{3} \times (3\sqrt{3} \tan 65)</math>  <math>= 162 \tan 65^\circ = 347</math> cm<sup>3</sup> (3SF)</p>	<p>B1 M1 A1  M1 A1  M1 A1 A1  M1 A1 M1 A1  M1 A1 (14)</p>

Notes

*Please note the stipulations on exact answers and the rounding required. Please refer to General Principles.*

**Question 9****(a)**B1 for  $\angle ABC = 90^\circ$ , can be implied from workingM1 for any acceptable trigonometry using a complete method to find  $BC$ A1 for the value  $6\sqrt{3}$  only. Do not accept any decimal value for this mark**(b)**M1 for using any acceptable trigonometry using a complete method to find  $BP$ A1 for the value of  $3\sqrt{3}$  only ✱ (this is a 'show' question, all working must be correct)**(c)**M1 for using any acceptable trigonometry using a complete method involving angles  $25^\circ$  or  $65^\circ$ A1 for a correct expression for  $BF$ A1 for  $BF = 11.1$  (cm) – correct to 3sf for this mark**(d)**M1 for an attempt at an expression for  $BD$  or  $DP$ , please refer to the ms for examples - ft their values for  $BC$  and  $BF$ , but must use  $3\sqrt{3}$  for  $BP$ A1 for  $BD = \sqrt{232.17} = 15.24$  or  $DP = \sqrt{205.2} = 14.32$ M1 for using an expression of any acceptable trigonometry to find  $BDP$ A1 for  $\angle BDP = 19.9^\circ$  - correct to 1dp**(e)**M1 for an expression of the volume using the given  $AC (=12)$ ,  $BP = 3\sqrt{3}$  only, and their  $BF$ A1 for  $347 \text{ cm}^3$  (correct to 3sf)**Lengths of line in the prism for examiners**

$$AC = DE = 12$$

$$AB = EF = 6$$

$$BP = 3\sqrt{3}$$

$$BF = CD = AE = 11.14\ldots$$

$$AD = CE = 16.37\ldots$$

$$CP = 9$$

$$AP = 3$$

$$BC = DF = 6\sqrt{3}$$

$$DP = 14.32\ldots$$

$$BD = 15.24\ldots$$