Multiple-choice section

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Answer | B | D | B | D | C | B | A | C | A | D |

Question 1 [7.1]

B

Find the right-angled triangle that enables you to find the length of the diagonal across the bottom of the prism.

|  |  |
| --- | --- |
|  | Use Pythagoras’ theorem:  x2 = 122 + 212  x =  x = 24 cm (nearest cm) |

Question 2 [7.1]

D

|  |  |
| --- | --- |
|  | Use Pythagoras’ theorem and the unrounded values:  x2 = 585 + 82  x =  = 24.474..  x = 25 cm (nearest cm) |

Question 3 [7.1]

B

|  |  |
| --- | --- |
|  | CA = 24 cm  FA = 25 cm  cos(θ) =  θ = cos-1  θ = 16° (nearest degree) |

Question 4 [7.2]

D

cos(216°) = cos(180° + 36°) = -cos(36°)

Question 5 [7.2]

C

Amplitude = (2.5 – (−0.5)) = 1.5, Period = 180°

Question 6 [7.3]

B

|  |  |
| --- | --- |
|  | In 1st quadrant:  x = cos-1(0.8) = 37°  In 4th quadrant:  x = 360 − 37°  = 323° |

Question 7 [7.4]

A



Question 8 [7.4]

C

Cosine rule: x2 = a2 + a2 − 2 × a × a × cos(θ)

x2 = 2a2 − 2a2 cos θ



Question 9 [7.6]

A

A = absin(θ)

= × sin(30°)

= 0.5x cm2

Question 10 [7.6]

D

A =  × ka2 × sin(30°)

= ka2

The area will be a2 for k = 4.

Multiple-choice total marks: 10

Short answer section

Question 11 4 marks [7.1]

|  |  |
| --- | --- |
| PM10_PR_SA_6_01  Length of diagonal = 50 cm  (7, 24, 25 so 14, 48, 50 are both sets of Pythagorean triples) | PM10_PR_SA_6_02  Length of sloping edge:  x2 = 252 + 602  x2 = 4225  x =  x = 65 cm |

Angle required = sin-1

= 67.380…

= 67° 22’ 48"

Question 12 2 marks [7.1]

Let r be the radius.

sin(2β) = 

r = A sin 2β

Area = πr2

= π(A sin 2β)2

= πA2 (sin 2β)2 m2

Question 13 2 marks [7.1]

Length of diagonal on base = 

= 29

Angle with base = tan-1

= 33.231…°

= 33°13'54"

Question 14 6 marks [7.2]

|  |  |  |
| --- | --- | --- |
| (a) –cos(258°) = -cos(180 + 78)° = -cos(78°) = cos 78°) | (b) tan(417°) = tan (360 + 57)° = tan(57°) | (c) sin(-132°) = sin(360 – 132)° = sin(228°) = sin(180 + 48)° = -sin(48°) |

Question 15 2 marks [7.2]

φ = 180° − θ or 180° + θ

Question 16 2 marks [7.2]

(a) Period = 45° (b) Amplitude: 0.5(1 – (-4)) = 2.5

Question 17 4 marks [7.3]

(a) θ is in quadrant 1.  


θ = 57.53°, where n is a positive integer.

(b) tan(θ) is negative in quadrants 2 and 4 so the required angles would be in quadrants 2 and 4.

Question 18 6 marks [7.4]

|  |  |
| --- | --- |
| (a)  A =43.212…  = 43°13’ (nearest minute) | (b) Angle C = 180° − (78° + 43°12' 44") = 58°47'15"  (c) Calculate the length of side c. |

Question 19 3 marks [7.4]

AC2 = AB2 + BC2 − 2 × AB × BC × cos(120°)

= (3x)2 + x2 – 2 × 3x × x × cos 120°

= 10x2 + 3x2

= 13x2

AC = =. AC istimes longer than BC.

Question 20 6 marks [7.4]

(a) a = 2b, c = 7b  
c2 = a2 + b2 – 2ab cos(θ)  
49b2 = 4b2 + b2 – 2 × 2b × 7b × cos(θ)  
44b2 = -28b2 cos(θ)  
  
cos(θ) =  < −1  
As -1 ≤ cos(θ) ≤ 1, there is no solution for θ.

(b) A triangle with sides in the ratio of 1 : 2 : 7 cannot be formed.

(c) The sum of the two smaller sides b and 2b must be less than 3b.  
b + 2b = 3b is a straight line.  
The difference of the two smaller sides b and 2b must be more than b.  
2b − b = b is a straight line.

Question 21 4 marks [7.6]



  
Area = × 37 × 51 × sin 101°  
= 927.3073  
= 926 m2

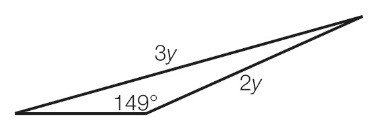
Question 22 2 marks [7.6]

Area = × 2.1 × 1.6 × sin(54°)  
= 1.359 149  
= 1.36 km2

Short answer total marks: 43

Extended answer section

Question 23

(a) (i) 

7 marks [7.6]

|  |  |
| --- | --- |
| (ii)  Included angle = 10.92  = 11° | (iii) Area = × 3y × 2y × sin 10.92° = 3y2 sin 10.92° |
| (b) 121 = 3y2 sin 10.92° y2 = 212.94… y = 14.59  y = 15 m | (c) (Length of third side)2 = (3y)2 + (2y)2 – 2 × 3y × 2ycos(10.92°) = 13y2 – 12y2 cos(10.92°) = 259.20 Length of third side = 16.10 Perimeter = 3 × 14.59 + 2 × 14.59 + 16.10 = 89.06 = 87 m Note: answer must be rounded up otherwise the fencing would be a little short. |

Question 24 5 marks [7.2, 7.3]

(a) Period = 6 hours, Amplitude = 1.5 m

(b) 7 pm Sunday + 4.5 hours = 11.30 pm Sunday  
11.30 pm Sunday + 6 hours = 5.30 am Monday

(c) y = -1.5 sin(60x) – 1  
0 = -1.5 sin(60x) – 1  
  
sin(x) is negative in quadrant 3 and 4. There are two cycles:  


(d) 2 × (5.3 – 3.7) = 2 × 1.6  
= 3.2 hours

Question 25 10 marks [7.5, 7.6]

|  |  |
| --- | --- |
| (a) | |
|  | Area of =  =  = 1240.49 cm2 |
| (b) | BD = BE + ED = 43.1826 + 25.9378 = 69.12 cm |

(c) Area of ΔBCD =  × BD × DC × sin(45°)  
=  × 69.12 × 65 × sin(45°)  
= 1588.45 cm2

(d) Total cross-sectional area = 1240.49 + 1588.45  
= 2828.94 cm2

(e) BC2 = BD2 + DC2 – 2 × BD × DC × cos(45°)  
= 69.122 + 652 – 2 × 69.12 × 65 × cos(45°)  
= 2648.80  
BC = 51.47  
Perimeter = 75 + 51.47 + 65 + 25.9378 + 57.6727   
= 275.07 cm

Extended answer total marks: 22

TOTAL test marks: 75