# Revision answers: Geometry (Topics 3 & 4)

**Coursebook chapters: 9–14**

**1. **(52)(1.2 – sin 1.2) = 3.35 cm2 *[4 marks]*

**2.** tan (2*θ***)** = , 0 ≤ 2*θ* ≤ 360°

 = 60°

⇒ 2*θ* = 60° or 60 + 180 = 240°

⇒ *θ* = 30°, 120° *[5 marks]*

**3. **

 = 0.895

∴  = 63.5° or 180 – 63.5 = 116.5° *[5 marks]*

**4. **



∴  = 7°





∴  = 156°

 = 180 – 7 – 156 = 17° *[9 marks]*

**5.** amplitude =  = 3.5 ∴ *A* = 3.5

*B* =  = 1.5

half-period =  = 3 *[5 marks]*

**6.** 2*x* + 30 ∈ [30, 750]; 2*x* + 30 = 60, 300, 420, 660 ∴ *x* = 15, 135, 195, 315 *[5 marks]*

**7.** Substitute *x* = 5*t* + 3, *y* = 3*t* – 1, *z* = t + 4 into 4*x* – *y* + 2*z* = 7 to get *t* = −

Hence the coordinates are. *[5 marks]*

**8.** Using tan2 *x* = sec2 *x* – 1:

sec2 *x* – sec *x* – 2 = 0 ⇒ sec *x* = 2 or −1

cos *x* = or −1, so *x* = *[7 marks]*

**9.** (a) Write BC = 5*x*, AC = 4*x*, then:

 ⇒  ⇒ 8 cos *θ* = 5 (as sin *θ* ≠ 0)

∴ *θ* = 51.3°

(b) 51.3°, 103°, 26.0° *[6 marks]*

**10.** (a) *R* cos(*x* + *θ*) = *R* cos *θ* cos *x* – *R* sin *θ* sin *x*

⇒ *R*2 = + 12 = 4, tan *θ* = 

∴ *R* = 2, *θ* = 

(b)  = 1 *[6 marks]*

**11.** (a) Gaussian elimination gives:

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Hence *a* = 14.

(b) Setting *z* = *t*: ***r*** = *[8 marks]*

**12.** (a) ***r*** = *t*

(b) (8, −2, −4)

(c) cos *θ* =  = −0.106 ∴ *θ* = 96.1°

(d) AB =  = , distance = sin(180 – 96.1) = 4.56 *[12 marks]*

**13.** sin *A* =, so cos *A* = *[3 marks]*

**14.** (a)  = 0

⇔ cos2 *θ* – sin2 θ − sin θ cos *θ* = 0

⇔ cos 2*θ* − sin 2*θ* =

⇔ 2cos 2*θ* = sin 2*θ*

⇔ tan 2*θ* = 2

(b)  = 2

⇔ 2 tan2 *θ* + 2 tan *θ* – 1 = 0

⇔ tan *θ* 

*θ* ∈  ⇒ tan *θ* > 0

∴ tan *θ* = *[9 marks]*

**15.** (a) Add up the two formulae.

(b) Setting A – B = *θ*, A + B = 3*θ* gives A = 2*θ*, B = *θ*.

So, sin *θ* + sin 3*θ* = 2 sin 2*θ* cos *θ* = 2(2sin *θ* cos *θ*)cos *θ* = 4sin *θ* cos2 *θ* *[5 marks]*

**16.** (a) cos *θ* =  = 0.492 ∴ *θ* = 60.5°

(b) Solving equations for the second and third components gives *s* = 3, *t* = 1.

So, 1 + 1(3) = *k* + 3(1) ∴ *k* = 1

(c) (i)  **= *n***

(ii) The plane contains the point (4, −1, 3).

So the equation is: 3*x* – 5*y* – 4*z* =  = 5.

(d) Line through (5, 1, 2) in the direction of the normal is ***r*** = .

Intersects the plane when 3(5 + 3*λ*) – 5(1 − 5*λ*) – 4(2 − 4*λ*) = 5 ⇒ *λ =*.

The distance is *[15 marks]*