M1.

(a)   0.64

B1

(b) $\frac{x}{4} = \cos 50°$

or

$\frac{x}{4} = \text{their } 0.64$

or

4 × their 0.64

oe
their 0.64 from (a)

M1

2.6

oe
ft their 0.64 from (a)

A1ft

[3]

M2.

Alternative method 1

6 and 10 seen

M1

(their 6)² + (their 10)² or 136

M1dep

[11.66, 11.7] or $\sqrt{136}$ or $2\sqrt{34}$

A1

Alternative method 2

$12^2 + 20^2$ or 544

M1

$\sqrt{\text{their } 544}$ or $4\sqrt{34}$

or [23.32, 23.324]

M1dep

[11.66, 11.7] or $\dfrac{\sqrt{544}}{2}$ or $\sqrt{136}$

or $2\sqrt{34}$

A1

[3]

M3.
    (a)   **Alternative method 1**

$10 \div 4$ or 2.5

or $4 \div 10$ or 0.4

or $\dfrac{1}{2}$ × (18 + 10) × 25 or 350

        oe

M1

18 ÷ their 2.5
or 18 × their 0.4 or 7.2
or 25 ÷ their 2.5
or 25 × their 0.4 or 10

        oe

M1dep

$\frac{1}{2}$ × (18 + 10) × 25 or 350

and

$\frac{1}{2}$ × (their 7.2 + 4) × their 10 or 56
Must see working

M1dep

350 − 56 = 294
Do not award without working seen

A1

Alternative method 2

10 ÷ 4 or 2.5

or 4 ÷ 10 or 0.4

or $\frac{1}{2}$ × (18 + 10) × 25 or 350
oe

M1

(Area scale factor =) (their 2.5)²
or (their 0.4)²

M1dep

their 350 ÷ (their 2.5)²
or their 350 × (their 0.4)² or 56
Must see working

M1dep

350 − 56 = 294
Do not award without working seen

A1

(b) $\dfrac{18 - 10}{2}$ or 4

B1

$\tan x = \dfrac{25}{\text{their } 4}$

M1

[80.9, 81]

A1

[7]

M4.
$9^2 + 16^2$
or $81 + 256$
or 337

M1

$\sqrt{9^2 + 16^2}$

or $\sqrt{81 + 256}$

or $\sqrt{337}$

M1dep

18.35… or 18.36

A1

18.4

ft their answer to 2 dp or better

B1ft

Additional Guidance
18.4 on its own

M1M1A1B1

18.40

M1M1A1B0

18.3

M1M1A0B0

[4]

M5.

Alternative method 1

$\tan 25 \ (= \frac{x}{30})$

M1

30 tan 25 or [13.9, 14]

M1

30 tan 25 ÷ 3 × 5
or [4.6, 4.7] × 5
or their height ÷ 3 × 5

M1

[23.3, 23.4]

Accept 23

A1

Alternative method 2

$\frac{30}{\sin 65} = \frac{b}{\sin 25}$

M1

$\frac{30 \sin 25}{\sin 65}$ or [13.9, 14]

M1

$\frac{30 \sin 25}{\sin 65} \div 3 \times 5$

or [4.6, 4.7] × 5
or their height ÷ 3 × 5

M1

[23.3, 23.4]

Accept 23

A1

Alternative method 3
$30 \div 3 \times 5$ or 50

M1

$\tan 25 \ (= \frac{x}{50})$

M1

$50 \tan 25$

M1

[23.3, 23.4]
                        Accept 23

A1

Additional Guidance
$50 \tan 25$ or $\dfrac{50 \sin 25}{\sin 65}$

M1M1M1A0
                                                        [4]

M6.
Use of tan

$\sqrt{40^2 + 55^2}$ *and use of sin, cos, sine rule or cosine rule*

M1

$\tan^{-1}\left(\frac{55}{40}\right)$ or $\tan^{-1}\left(\frac{40}{55}\right)$

or $\tan A = \left(\frac{55}{40}\right)$ or $\tan B = \left(\frac{40}{55}\right)$

                        oe

$eg \ \sin^{-1}\left(\dfrac{55}{\sqrt{40^2 + 55^2}}\right)$

M1

53.9(…) or 54 or 54.0
or 36.(…) or 36.0

A1

143.9(…) or 144
                        SC3 for 324 or 323.9…

A1

Additional Guidance
Scale drawing can score 0, 3 or 4 but must be accurate

$\tan = \frac{55}{40}$ or $\tan = \frac{40}{55}$

M1M1

$\tan = \frac{55}{40}$ or $\tan = \frac{40}{55}$ or $\tan A = (\frac{40}{55})$ or $\tan B = (\frac{55}{40})$ recovered

M1M1

$\tan = \frac{55}{40}$ or $\tan = \frac{40}{55}$ or $\tan A = (\frac{40}{55})$ or $\tan B = (\frac{55}{40})$ not recovered

M1M0
                                                              [4]

M7.

$\sin 30 = \frac{6}{l}$

M1

$\frac{6}{\sin 30}$ or 12

M1dep

$\cos x = \frac{8}{\text{their } 12}$ or $0.66\ldots$ or 0.67

or $\cos x = \frac{8 \times \sin 30}{6}$

$$cos^{-1} \frac{2}{3}$$

oe

M1dep

48.(…)

A1
                                                              [4]

M8.

Alternative method 1
$6.25^2 + 15^2$

or $39(.0625) + 225$

or $264(.0625)$

5, 12, 13 seen

M1

$$\sqrt{6.25^2 + 15^2}$$

or $\sqrt{39(.0625) + 225}$

or $\sqrt{264(.0625)}$

oe
$$\frac{13}{5} \times 6.25$$

or $\frac{13}{12} \times 15$

M1dep

[16.2, 16.3]

Allow 16 with working shown

A1

Alternative method 2

$\tan^{-1}\frac{6.25}{15}$ or 22.6...

or $\tan^{-1}\frac{15}{6.25}$ or 67.38...

M1

$$\frac{15}{\cos \text{ their } 22.6}$$

or $\frac{15}{\sin \text{ their } 67.38}$

or $\frac{6.25}{\sin \text{ their } 22.6}$

or $\frac{6.25}{\cos \text{ their } 67.38}$

M1dep

[16.2, 16.3]

Allow 16 with working shown

A1

[3]

M9.$5^2 + 9^2$

or 25 + 81

or 106

M1

$$\sqrt{5^2 + 9^2}$$

or $\sqrt{25 + 81}$

or $\sqrt{106}$

M1dep

10.29…

Allow 10 or 10.2 if correct working shown

A1

10.3

ft their 2 d.p. answer

B1ft

[4]

M10.

Use of sine with 15 and 28 (even if nonsense)

$$\frac{x}{sin\ 90} = \frac{15}{sin\ 28}$$

M1

$(x =)$ 15 ÷ sin 28 or 15 ÷ 28 sin or sin 28 = 15 / x

This is for a correct use of sin 28, 15 (and x)

M1Dep

[31.9, 32]

If answer in range then award full marks if working using sine seen.

32 must have working.

If answer not in range, award part marks as above.

)

NB If adjacent found by tan, [28, 28.21] and then Pythagoras or inverse cosine used must be a complete method for M2.

A1

[3]

M11. $15^2 - 7^2$

or $x^2 + 7^2 = 15^2$

$cos\ 27.(…) = \dfrac{x}{15}$ *or* $cos\ 28 = \dfrac{x}{15}$

or $sin\ 62.(…) = \dfrac{x}{15}$

M1

$\sqrt{15^2 - 7^2}$ or $\sqrt{176}$

15 cos 27(…) or 15 cos 28
or 15 sin 62(…)

M1dep

13.26(…) or 13.3 or 13.27 or 13

or $4\sqrt{11}$

A1

[3]

M12.
(a) $25^2 + 43^2$

   $43^2 - 25^2$

M1

   $\sqrt{\text{their } 2474}$

M1Dep

   49.7 …

Accept 50 with working
Ignore incorrect working after correct answer seen

A1

Alternative
Either angle correctly calculated to 30 or 60 or better and used with an appropriate trig ratio and side

> *Angles are 30.17… and 59.826*
>
> *eg 43 ÷ cos 30*
>
> *or 43 ÷ sin 60*
>
> *or 25 ÷ cos 60*
>
> *or 25 ÷ sin 30*
>
> **NB** *if cosine rule used then*
>
> *25² + 43² − 2 × 25 × 43 × cos90 must lead to √2474 for M2 otherwise it is M0*

M2

[49.69, 49.75]

> *A0 if outside range due to premature rounding.*

A1

(b)   Sight of tan

M1

tan x = 15 ÷ 33

> *oe*

M1Dep

24.4..

> *Accept 24 with working*
> *Ignore incorrect rounding after correct answer seen*

A1

Alternative
Hypotenuse correctly calculated as [36, 36.3] and then either side used with the hypotenuse and an appropriate trig ratio or cosine rule

> *eg cos⁻¹(33 ÷ 36)*
>
> *sin⁻¹(15 ÷ 36)*
>
> *or*
>
> *cos y = (33² + 36² − 15²) ÷ (2 × 33 × 36)*

M2

[24.35, 24.45]

> *A0 if outside range due to premature rounding.*

A1

[6]

M13.

sin used or selected

M1

$\sin (y) = \dfrac{2.47}{27.37}$ **or** $\sin^{-1}\!{}_{\text{ยน}} \dfrac{2.47}{27.37}$

$M2 \quad 180 - 90 - \cos^{-1}\!{}_{\text{ยน}} \dfrac{2.47}{27.37}$

or

$\cos(y) = \dfrac{\sqrt{27.37^2 - 2.47^2}}{27.37}$

or

$\tan(y) = \dfrac{2.47}{\sqrt{27.37^2 - 2.47^2}}$

M1

[5.175, 5.2]

Accept 5 if correct method seen
SC2 Answer [0.09, 0.0904]
SC2 Answer [5.75, 5.8]

A1

[3]

M14.

(a) $\dfrac{x}{16}$

B1

(b) $\dfrac{9}{x} = \dfrac{x}{16}$

M1

$x = 12$

A1

Alternative method
$16^2 - x^2 = x^2 - 9^2 + 7^2$

oe

M1

$x = 12$

A1

[3]

3