Y11 October 2019 Alpha MS

Q1.

A

$19^2 = 361 \longrightarrow 400$ (no other working)

B1

[1]

Q2.

$6c(c^2 + 5)$ or $3(c^2 + 5)$

M1

$$\frac{6c\left(c^2 + 5\right)}{3\left(c^2 + 5\right)}$$

This mark implies first M1

M1

$2c$ and multiple of 2 so even

oe statement
Must see method

A1

[3]

Q3.

180 − 42 − 42 (= 96)

oe

Angle BOC = 2a

Angle BOC = 96

Angle OBC = 42

$2a + 42 + 42 = 180$

M1

their 96 ÷ 2

$a + 42 = 90$ or $2a = 96$

M1dep

48

A1

[3]

Q4.

$6(x + 3)$ or $(–)2(x – 2)$
or $6x + 18$ or $2x – 4$ or $–2x + 4$
or $(x – 2)(x + 3)$

M1

$6x + 18 - 2x + 4$
or $4x + 22$
or $x^2 - 2x + 3x - 6$
or $x^2 + x - 6$

allow three correct terms after expansion
ignore RHS and denominator

allow three correct terms after expansion as denominator or RHS

M1

$x^2 - 3x - 28 = 0$

A1

$(x - 7)(x + 4)$ (= 0)

correct method to solve their quadratic equation by

correct substitution into the quadratic formula

or correct completion of the square

or correct factorisation

M1

(x =) 7 and (x =) – 4

SC2 (x =) 7 or (x =) – 4

A1

Additional Guidance

Correct substitution into quadratic formula

$$x = \frac{--3 \pm \sqrt{(-3)^2 - 4\times1\times-28}}{2\times1}$$

[5]

Q5.

cos 36 = $\frac{AC}{13.3}$

oe

M1

AC = 13.3 × cos 36
or 10.75… or 10.76

oe

M1dep

tan CAT = $\frac{9.6}{\text{their } 10.76}$

oe

M1dep

41.7

Allow 42 with working

A1

[4]

Q6.

Alternative method 1

$\cos 40° = \frac{y}{100}$ or 100 cos 40°

or $\sin 50° = \frac{y}{100}$ or 100 sin 50°

or 76.6(0…)

Any letter

y is the vertical side

May be seen on diagram

M1

$\sin 40° = \frac{x}{100}$ or 100 sin 40°

or $\cos 50° = \frac{x}{100}$ or 100 cos 50°

or $\tan 40° = \frac{x}{\text{their } y}$ or

their y × tan 40°

or $\tan 50° = \frac{\text{their } y}{x}$

or $\frac{\text{their } y}{\tan 50}$

or $\sqrt{100^2 - \text{their } y^2}$

or [64.27, 64.3]

Any letter

x is the horizontal side

May be seen on diagram

M1

their $64.3^2 + 120^2 - 2 \times$ their $64.3 \times 120 \times \cos 30°$

or [5169, 5172.4]

M1

$\sqrt{\text{their } [5169,\ 5172.4]}$

or [71.8, 71.92]

Dependent on third M1

May be seen on diagram

M1dep

$$\frac{\text{their } 76.6 + \text{their } [64.27, 64.3] + \text{their } [71.8, 71.92] + 100 + 120}{50}$$

M1dep

9

A1

Alternative method 2

sin 40° = $\frac{x}{100}$ or 100 sin 40°

or cos 50° = $\frac{x}{100}$ or 100 cos 50°

or [64.27, 64.3]

Any letter

x is the horizontal side

May be seen on diagram

M1

cos 40° = $\frac{y}{100}$ or 100 cos 40°

or sin 50° = $\frac{y}{100}$ or 100 sin 50°

or tan 40° = $\frac{\text{their } x}{y}$ or $\frac{\text{their } x}{\tan 40}$

or tan 50° = $\frac{y}{\text{their } x}$ or

or their x × tan 50°

or $\sqrt{100^2 - \text{their } x^2}$

or 76.6(0…)

Any letter

y is the vertical side

May be seen on diagram

M1

their $64.3^2 + 120^2 - 2 \times$ their $64.3 \times 120 \times \cos 30°$

or [5169, 5172.4]

M1

$\sqrt{\text{their [5169, 5172.4]}}$

or [71.8, 71.92]

Dependent on third M1

May be seen on diagram

M1dep

$$\frac{\text{their } 76.6 + \text{their } [64.27, 64.3] + \text{their } [71.8, 71.92] + 100 + 120}{50}$$

M1dep

9

A1

Additional Guidance

First 2 M marks
Sides have been transposed

M0 M0

Third M1 is not dependent

[6]

Q7.

$(w + 5)(w - 5)$

B1

$(w + 1)(w + 2)$

B1

$(3w + a)(w + b)$

$ab = 5$ or $a + 3b = -16$

M1

$(3w - 1)(w - 5)$

A1

$$\frac{6w-2}{w+1}$$

A1

[5]

Q8.

Angle *CAD* = 46 **or**

Angle *ACD* = 37 **or**

Angle *CDE* = 83 **or** (37 + 46) **or**

Angle *ADC* = 97 **or** 180 − (37 + 46)

Any of these angles correctly marked or named ... could be on diagram

M1

Angle *DCE* = 46 **or**

Angle *ACE* = 83 **or** (37 + 46)

M1

51

A1

[3]

Q9.

Join *BD*

Angle *BDC* = $2x$

Alternate segment theorem

M1

Angle *BDO* = x

M1

Angle *DBO* = x

Isosceles triangle BOD

M1

Angle *BOD* = $180 - 2x$

Angle sum of triangle BOD

M1

$y = 360 - 90 - 90 - (180 - 2x)$

$y = 2x$

Angle sum of quadrilateral ABOD

y = 2x clearly shown from simplification

A1

Must have at least two different reasons stated in the proof

B1ft

Alternative method 1

Angle *OBC* = $90 - 2x$

Tangent-radius property

M1

Angle *OCB* = $90 - 2x$

Isosceles Δ OBC

M1

Angle *OCD* = x

Isosceles Δ OCD

M1

Angle *BCD* = $90 - 2x + x$

$= 90 - x$

hence

Angle *BOD* = $180 - 2x$

Angle at centre = 2 × angle at circumference

M1

$y = 360 - 90 - 90 - (180 - 2x)$

$y = 2x$

Angle sum of quadrilateral ABOD

y = 2x clearly shown from simplification

A1

Must have at least two different reasons stated in the proof

B1ft

Alternative method 2

Angle *OBC* = 90 − 2*x*

Tangent-radius property

M1

Angle *OCB* = 90 − 2*x*

Isosceles Δ OBC

M1

Angle *OCD* = *x*

Isosceles Δ OCD

M1

Angle *BCD* = 90 − 2*x* + *x*
= 90 − *x*
hence

Angle *BOD* = 180 − 2*x*

Angle at centre = 2 × angle at circumference

M1

Angle *BOD* = 360 − 90 − 90 − *y*
= 180 − *y*
hence *y* = 2*x*

Angle sum of quadrilateral ABOD

y = 2x clearly shown from simplification

A1

Must have at least two different reasons stated in the proof

B1ft

Alternative method 3

Angle *OBC* = 90 − 2*x*

Tangent-radius property

M1

Angle *OCB* = 90 − 2*x*

Isosceles Δ OBC

M1

Angle *OCD* = *x*

Isosceles Δ OCD

M1

Angle *BCD* = 90 − 2*x* + *x*
= 90 – *x*

M1

y = 360 − 90 − (90 − 2*x*) − (90 − *x*) − *x* − 90
hence *y* = 2*x*

Angle sum of quadrilateral ABCD

$y = 2x$ clearly shown from simplification

A1

Must have at least two different reasons stated in the proof

B1ft

Alternative method 4

Angle *BOD* = 180 − y

Angle sum of quadrilateral ABOD

M1

Angle *OCD* = x

Isosceles Δ OCD

M1

Angle *OBC* = 90 − 2x

Tangent-radius property

M1

Angle *BCO* = 90 − 2x

hence

Angle *BOD* reflex = 360 − (90 − 2x) − (90 − 2x) − x − x = 180 + 2x

Isosceles Δ OBC

Angle sum of quadrilateral BODC

... this can also come from Angle BOC (4x) + Angle DOC (180 − 2x)

M1

180 − y + 180 + 2x = 360

hence $y = 2x$

Angles round a point

$y = 2x$ clearly shown from rearranging

A1

Must have at least two different reasons stated in the proof

B1ft

[6]