

M1.

angle $ABC = x$

M1

angle $BAC = x$ and
alternate segment theorem

M1

angle $ABC = x$ and
angle $BAC = x$ and
alternate segment theorem and two equal angles so isosceles ($AC = BC$)

A1

[3]

M2.

(a) $(180 - 38) \div 2$

M1

71

May be on diagram if no contradiction

A1

(b) $ODE = 90$ seen or implied
or $CDO = 25$
or $COD = 130$

May be on diagram

B1

$DOE = 50$
or $CDE = 115$
or 140 seen

May be on diagram

M1

40

A1

Additional Guidance

40 with no working seen

B1M1A1

115 is B1M1 unless from clearly incorrect working
e.g. 115 leading to an answer of 65 is M1 only

[5]

M3.

(a) 108

B1

Opposite angle of a cyclic quadrilateral

Strand (i)

(add up to 180)

Must have 108

Q1

Additional Guidance

Must see "opposite" and "cyclic" (oe e.g. quadrilateral in a circle)

(b) 125

B1

[3]

M4.

(a) 90 seen or implied

B1

90 ÷ 6 or 15

or 90 ÷ 6 × 5 or 75
oe

M1

30

A1

Additional Guidance

30 without working

B1M1A1

(b) Angle $LMN = 80$

or angle $MLP = 58$
May be on diagram

M1

$180 - 80 - 58$
 oe

M1

42

A1

[6]

M5.

$ABC = 52$
May be on diagram

M1

$BAC = 52$

or $BAQ = 104$

or $ACB = 76$

May be on diagram

M1dep

$PAB = 76$

or $PBA = 76$

May be on diagram

M1dep

28

Clear evidence that 28 is for angle x

A1

Additional Guidance

Angles may be on diagram

$ACB = 52$ and $ABC = 52$

M1 only

[4]

M6.(a) $OCA = 36$

or $ACB = 90$

or $COA = 108$

or $COB = 72$

or $OBC = 54$

or $90 - 36$

or $(180 - 72) \div 2$

oe

May be on diagram

M1

54

A1

(b) (Triangle) RDC is isosceles

or RC and RD are equal tangents

May be implied from 90 and 45 in triangle RDC

B1

Angle $RDC = y$

or Angle $RCD = y$

B1

Angle RDC or Angle RCD is 45

and

alternate segment (theorem) stated

Strand (ii)

Complete reasons with both B marks scored

Q1
[5]

M7.(a) 56

B1

(b) 70

B1

Alternate segment (theorem)
Strand (i)
Dependent on B1

Q1dep

(c) 2×47 or 94

or Angle BOA = 47

or Angle BOC = 47

or Angle BAC = 47

or Angle BCA = 47

May be on diagram (obtuse angle)

M1

90 or right angle symbol seen at A or

C

or $180 - 90 - 47$ or $(180 - 2 \times 47) \div 2$

oe

M1

43

A1

[6]

M8.

(a) 35

B1

(b) 40

B1

Opposite angles of cyclic quad (add up to) 180°

oe

*Strand (i) No need to mention 180 if angle given as 40**Accept 'supplementary' to mean adds to 180.*

Q1

(c) $x = 55$

$y = 110$

$z = 125$

*If answer line blank mark diagram or script.**B2 any two correct**B2 $y = 110$ and $x + z = 180$* *B2 $z = 125$ and $y = 2x$* *B1 any one correct**B1 values less than 180 such that $y = 2x$ or $x + z = 180$*

B3

[6]

M9.Any **one** of these equations

$2x + y + 20 = 180$

or

$x + 2y + y + 40 = 180$

or

$$2x + y + 20 = x + 2y + y + 40$$

or

$$2x + y + 20 + x + 2y + y + 40 = 360$$

oe

M1

Another of these equations

$$2x + y + 20 = 180$$

or

$$x + 2y + y + 40 = 180$$

or

$$2x + y + 20 = x + 2y + y + 40$$

or

$$2x + y + 20 + x + 2y + y + 40 = 360$$

oe

these simplify to ...

$$2x + y = 160 \text{ or}$$

$$x + 3y = 140 \text{ or}$$

$$x - 2y = 20 \text{ or}$$

$$3x + 4y = 300$$

M1

equating coefficients and elimination of x or y for their equations

e.g.

$$x + 3y = 140 \text{ and } 6x + 3y = 480$$

or

$$2x + 6y = 280 \text{ and } 2x + y = 160$$

rearrangement and substitution for their equations

e.g.

$$y = 160 - 2x \text{ and } x + 3(160 - 2x) = 140$$

or

$$x = 140 - 3y \text{ and } 2(140 - 3y) + y = 160$$

M1dep

Allow one numerical error for the 3rd M1, but not an error in method (e.g. adding equations when they ought to be subtracted is an error in method, so M0)

$$5x = 340 \text{ or } 5y = 120$$

ft their elimination or substitution

M1dep

$$x = 68 \text{ and } y = 24$$

A1

[5]

M10.

(a) Valid reason

e.g.1 Triangle OTS is isosceles

e.g.2 $OT = OS$

e.g.3 OT and OS are radii

B1

(b) Correct equation

e.g.1 $5x = 2(x + 30)$

e.g.2 $2.5x = x + 30$

e.g.3 $(180 - 2x) + 120 + 5x = 360$

e.g.4 $x + 30 + x + 30 + 360 - 5x = 360$

oe

Brackets not needed in e.g.3

M1

Collects terms for their initial equation

e.g.1 $5x - 2x = 60$

e.g.2 $2.5x - x = 30$

e.g.3 $-2x + 5x = 360 - 180 - 120$

oe

their initial equation must have ≥ 2 terms in x

Any brackets must be expanded correctly

M1

20

A1

[4]

M11.(a) 70

B1

(b) $ADE = 34$ or $AED = 180 - 70$ or 110or $ADC = 180 - 70 - 34$ or 76*Angles seen on diagram must be in correct place*

M1

 $ADE = 34$ and $AED = 180 - 70$ or 110

M1dep

36

A1

[4]