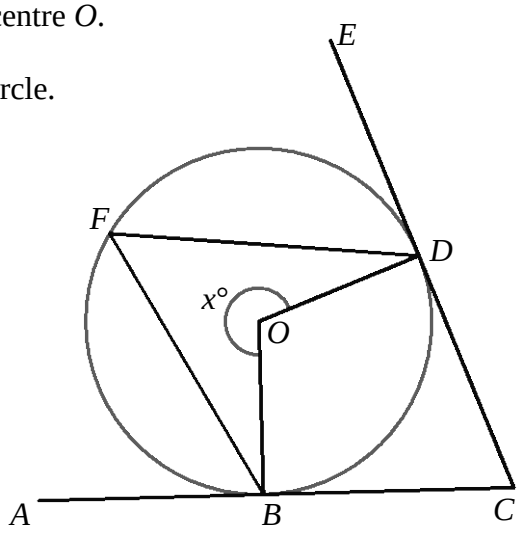
9. **(a)** *F*, *B* and *D* are points on the circle centre *O*.

ABC and *CDE* are tangents to the circle.
Reflex angle *BOD* = *x*°.

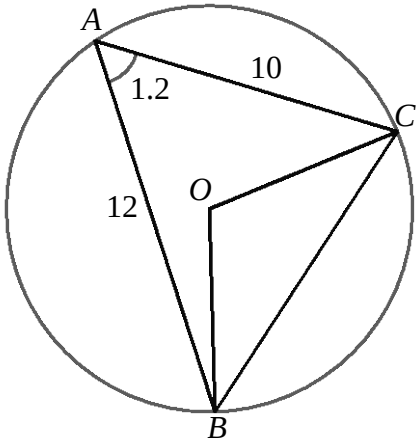


Find, in terms of *x*,

(i) angle *BFD*, [2]

(ii) angle *BCD*. [2]

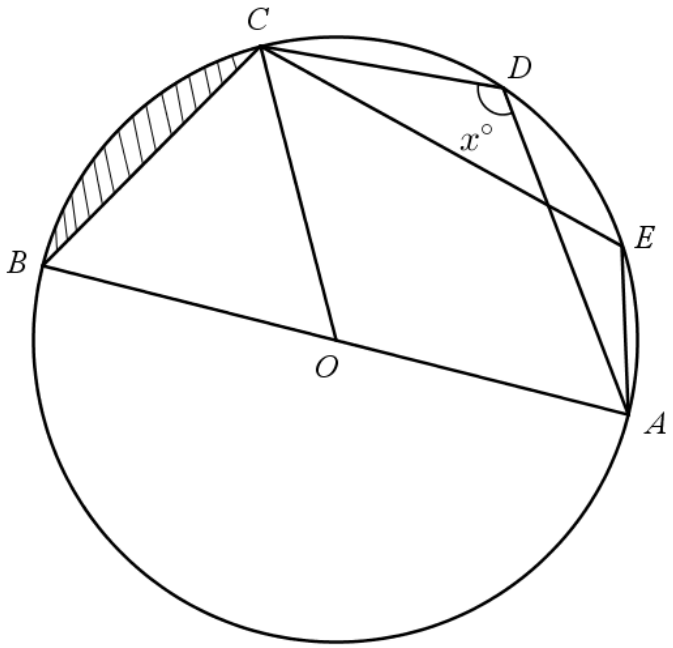
(b) *A*, *B* and *C* are points on the circle centre *O*.
AB = 12 cm and *AC* = 10 cm.
Angle *BAC* = 1.2 **radians**.



(i) Find the angle *BOC*. [1]

(ii) Calculate the length of the chord *BC*. [3]

9 In the diagram AOB is the diameter of a circle with centre O. $AOB = 16$ cm and $\angle ADC = x^{\circ}$.



(a) Find, in terms of x,

(i) reflex $\angle AOC$, **[1]**

(ii) $\angle AEC$, and **[1]**

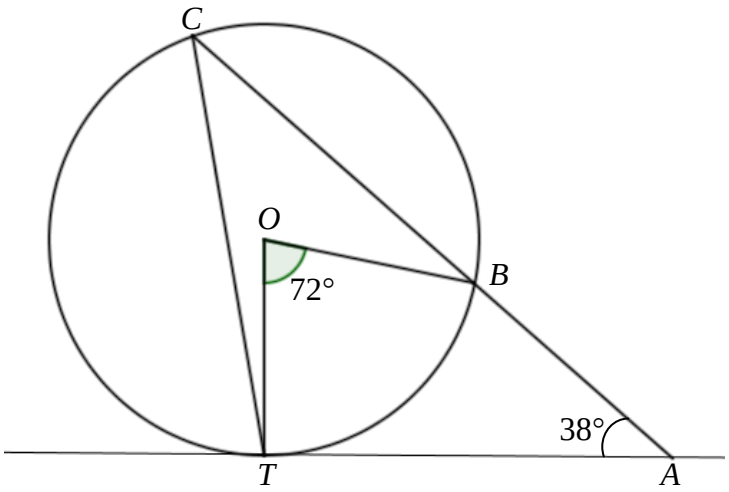
(iii) $\angle ABC$. Give reasons for your answers. **[1]**

(b) If $\angle COB = 0.75$ radians, calculate

(i) the area of ΔBCO, **[2]**

(ii) the area of the shaded segment. **[3]**

12 In the diagram, TA is a tangent to the circle whose centre is O.
$\angle TOB = 72°$ and $\angle TAB = 38°$.



(a) Stating the reasons clearly, calculate

(i) $\angle BCT$, [1]

(ii) $\angle OBA$, [1]

(iii) $\angle OTC$. [2]

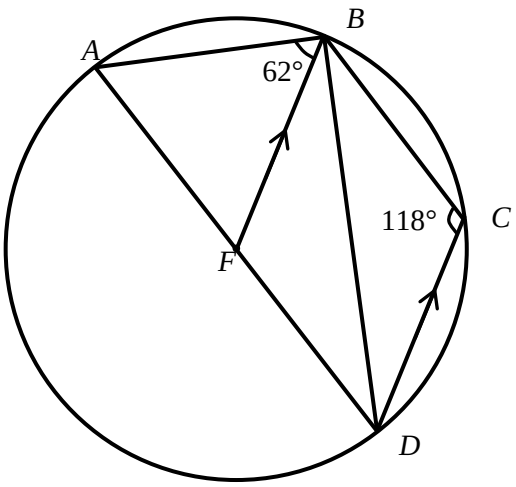
(b) If the radius of the circle is 9 cm, calculate

(i) the length of arc BT, [2]

(ii) the area of the minor sector OBT. [2]

End of Paper

11 **(a)**



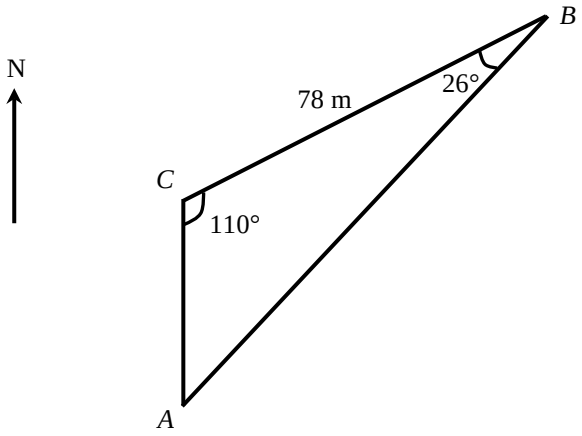
The diagram shows a circle *ABCD*. *AD* is a diameter of the circle and *BF* is parallel to *CD*. *F* is the centre of the circle. Angle $ABE = 62^{o}$ and angle $BCD = 118°$.

Calculate

(i) the angle *BFD*, [1]

(ii) the angle *DBC*, stating your reasons clearly. [2]

(b)



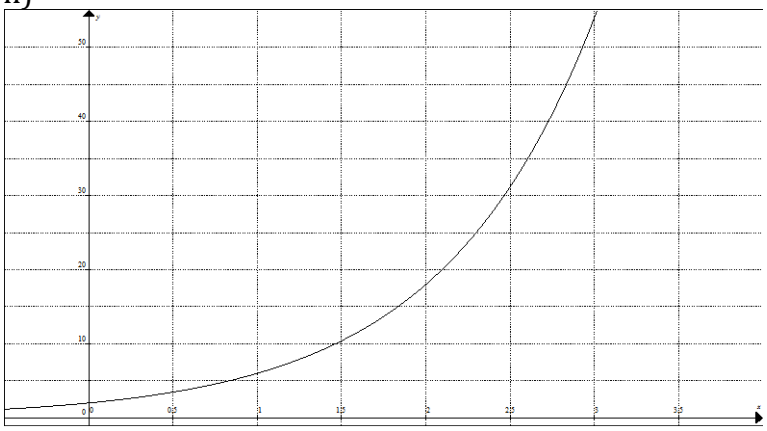
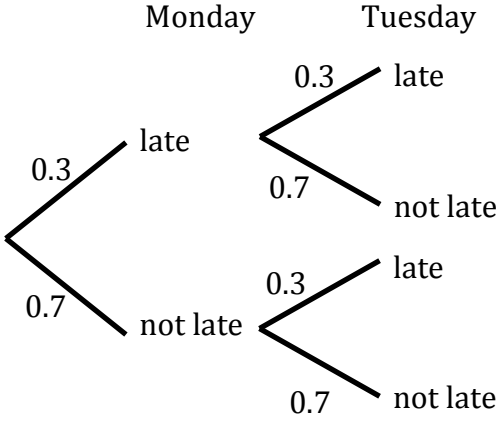
A, *B* and *C* are on level horizontal ground. $BC = 78\ \text{m}$, $A\hat{C}B = 110^{o}$ and $A\hat{B}C = 26°$. *C* is due north of *A*. Calculate

(i) the bearing of *B* from *C*. [1]

(ii) the bearing of *A* from *B*. [1]

(iii) the length of *AC*. [3]

End of Paper

		ii) $x = 0.5$	B1
	b	i) $p = 2$, $q = 31.2$	B1, B1
		ii) 	B1 – plotting the right points and labelling B1 – smooth curve.
		iii) $x = 1.844$ (Accept 1.65 to 2.03)	B1
9	a	$\angle BOD = 360 - x$	M1
		i) $\angle BFD = \frac{360-x}{2}$ *or* $180 - \frac{x}{2}$	A1
		ii) $\angle BCD = 360 - 90 - 90 - (360 - x)$ $= x - 180$	M1 A1
	b	$BC^2 = 12^2 + 10^2 - 2(12)(10)\cos 1.2$	M1
		i) $BC^2 = 157.034$	M1
		$BC = 12.5cm$	A1
		ii) $\angle BOC = 2.4rad$	B1
10	a	i) 3B1, they have a higher median	B1
		ii) IQR = 72 – 48 = 24	B1
		iii) 3B2, both classes have same IQR and range. in 3B1 median is higher, more people get the higher marks.	B1, or any other acceptable reasons.
	b	i) 	B1 for Monday not late = 0.7 B1 for Tuesday all correct values.
		ii) (a) 0.3 x 0.3 = 0.09	B1
		(b) 0.3 x 0.7 + 0.7 x 0.3	M1

Answer

1 **(a)** 8.1×10^{13}m

(b) 2.11×10^{5}

2 **(a)** 60 litres

(b) 28 bottles

3 **(a)** **(i)** $(2x+3)(x-5)$

(ii) $(3a-1)(b-5)$

(b) $x = 5.52$ or $x = -2.27$

(c) $\frac{9y^{10}}{5x^{3}}$

4 **(a)** -2

(b) $y = -2x + 10$

(c) $C\,(8, -6)$

(d) $D\,(0, 10)$

(e) 17.9 units

5 **(a)** 14

(b) $P = 2S + 2$

(c) $y = 96$

$n = 15$

6 **(a)** **(i)** $P\hat{Q}R = 49^{\circ}$

(ii) 68.5 km

(iii) 3140 km^2

(b) $\theta = 50.5^{\circ}$

7 **(a)** h = 17.2 cm

(b) m = 1431 g

(c) The larger jar gives the better value.

8 **(a)** $p = -1$

(c) **(i)** x = - 0.3 & - 5.7

(ii) - 1.02 ($\pm$ 0.1)

(d) x = - 1.75 & - 6.3

9 **(a)** **(i)** $2x$

($\angle$ at centre = twice $\angle$ at circumference)

(ii) x

($\angle$s in the same segment)

(iii) $180 - x$

(opp. $\angle$s of cyclic quad.)

(b) **(i)** 21.8 cm^2

(ii) 2.19 cm^2

10 **(a)** **(i)** 26 students

(ii) 38 marks

(iii) 25 marks

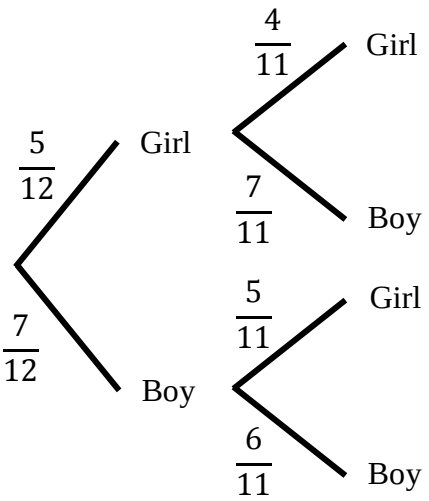
(iv) The students did better in Mathematics as the median mark is higher.

or

The students did better in English as the interquartile range is smaller hence results are more consistent

(b) **(ii)** $\frac{31}{66}$

(i)



9a)	$AB^2 = OB^2 + OA^2 - 2(OB)(OA)\cos(90° + 24°)$ $AB = \sqrt{40^2 + 49.6^2 - 2(40)(49.6)\cos 114°}$ $= 75.3m$ $(3s.f.)$	M1 A1	
b)	$\frac{\sin \angle OBA}{49.6} = \frac{\sin 114°}{75.33}$ $\angle OBA = 37.0°$ $(1d.p.)$	M1 A1	
c)	Bearing of B from A $= 114^\circ + 37.0^\circ - 90^\circ$ $= 061^\circ$	A1	
d)	$\tan\theta = \frac{11.5}{49.6}$ $\theta = 13.1°$	M1 A1	
	Section B		
10	As attached		
11ai)	Median mark = 73	A1	
aii)	Interquartile range = 81 – 61 = 20	A1	
bi)	Mean mark $= \frac{43(45) + 100(55) + 85(65) + 97(75) + 46(85) + 29(95)}{400}$ $= 67.25$	M1 A1	
bii)	Standard Deviation $= \sqrt{\frac{43(45)^2 + 100(55)^2 + \mathrm{K} + 46(85)^2 + 29(95)^2}{400} - (67.25)^2}$ $= 14.1 marks$	M1 A1	
biii)	ABC school has a higher mean score of 73 that of XYZ school of 67.25 marks. Since the standard deviation of ABC school's test score is less than that of XYZ school's test score, it would mean that ABC school has less variation than XYZ school in terms of the Mathematics test score.	B1 B1	
12ai)	$\angle BCT$ $= \frac{1}{2}(72°)$ (angle at centre = 2 angles at circumference) $= 36°$	A1	If reasons are not stated, 1 mark will be deducted from question 12(a).
aii)	$\angle BCT$ $= 360° - 72° - 38° - 90°$ (tan $\perp$ rad) , ($\angle$ sum of quad) $= 160°$	A1	

aiii)	$\angle OTC$ $= 180° - 36° - 38° - 90°$ (tan $\perp$ rad) , ($\angle$ sum of Δ) $= 16°$	B2	
bi)	Length of BT $= 9\left(\frac{2\pi}{5}\right)$ $= 11.3cm$ $(3s.f.)$	M1 A1	Accept workings in degree
bii)	Area of sector OBT $= \frac{1}{2}(9)^2\left(\frac{2\pi}{5}\right)$ $= 50.9cm^2$ $(3s.f.)$	M1 A1	

11(aia)	Angle BFD = 124° (angle at centre = 2x angle at circum.) Accept: ext angle = sum of 2 opp. int. angle	[A1]
11(aib)	Angle FBD = 28° (rt. angle triangle in semicircle) Angle BDC = 28° (alt. angles) Angle DBC = 180 – 118 – 28 = 34°	[M1] [A1]
11(bi)	Bearing of B from C = 070°	[A1]
11(bii)	Bearing of A from B = 360 – 110 – 26 = 224° or 180° + 44°	[A1]
11(biii	Angle CAB = 44° $\frac{78}{\sin 44°} = \frac{AC}{\sin 26°}$ $AC = \frac{78 \sin 26°}{\sin 44°}$ $= 49.2$	[M1] [M1] [A1]