BHASVIC MαTHS

Doubles Tracking Test 1B

(44 minutes) − 36 marks

Name_____

1. The times it took a random sample of runners to complete a race are summarised in the table.

Time taken (t minutes)	20-29	30-39	40-49	50-59	60-69
Frequency	5	10	36	20	9

(a) Use interpolation to estimate the interquartile range. (3 marks)

The midpoint of each class was represented by x and its corresponding frequency by f, giving:

$\sum fx = 3740, \sum fx^2 = 183040$

(b) Estimate the variance and standard deviation for this data. (3 marks)

2. A car is observed travelling along a straight horizontal road between two points on a road, A and B, where $AB = 1362m$. At time $t = 0\ s$ the car goes past point A with speed $30ms^{-1}$. The car maintains this speed for 17s. The car decelerates uniformly to a speed of $12ms^{-1}$. The car maintains the speed of $12ms^{-1}$ until it goes past B. The car took 70 s to travel from A to B

a) Sketch a speed time graph to show the motion of the car from A to B.

(2 marks)

b) Calculate the deceleration of the car during the motion described above.

(4 marks)

3. A teacher standardises the test marks of his class be adding 12 to each one and then reducing the mark by 20%.
    If the standardised marks are represented by t and the original marks by m:

    (a) Write down a formula for the coding the teacher has used. (1 mark)

    The following summary statistics are calculated for the standardised marks:

    $$n = 28 \qquad \bar{t} = 52.8 \qquad S_{tt} = 7.3$$

    (b) Calculate the mean and standard deviation of the original marks gained. (3 marks)

4. Three posts P, Q and R, are fixed in that order at the side of a straight horizontal road. The distance from P to Q is 45m and the distance from Q to R is 120m. A car is moving along the road with constant acceleration a m s^{-2}. The speed of the car, as it passes P, is u m s^{-1}. The car passes Q two seconds after passing P, and the car passes R four seconds after passing Q. Find:

   (i)   the value of u,

   (ii)   the value of a.

   (7 marks)

5. The diagram shows the sector OAB of a circle with centre O, radius 12cm and angle 1.2 radians.

The line AC is a tangent to the circle with centre O, and OBC is a straight line.

The region R is bounded by the arc AB and the lines AC and CB.

(a) Find the area of R, giving your answer to 2 decimal places. (8 marks)

The line BD is parallel to AC.

(b) Find the perimeter of DAB. (5 marks)

TT1 Part B

Answer:

1.

a) Q1=39.5+(5/36)*(10)=40.8888…   Q3=49.5+(9/20)*(10)=54   M1 one answer, correct method A1 for both correct

Q3-Q1=13.11111=13.1 minutes (3sf)   A1 must have units

b) $\frac{183040}{80} - \left(\frac{3740}{80}\right)^2 = 102 \; minutes^2 \; (3sf)$ M1 A1

sd. = sqrt = 10.1 minutes (3sf)   A1

2.		B1 Shape B1 Coordinates
	$$1368 = 17(30) + (53 - T)(12) + \frac{1}{2}T(30 + 12)$$ $$T = 24$$ $m = \frac{30-12}{24} = 0.75\text{ms}^{-2}$	M1 A1 M1A1

3.

a $t = 0.8(m + 12)$

b Mean of the standardised marks = $\bar{t} = 52.8$

$$\bar{t} = 0.8(\bar{m} + 12)$$

$$\bar{m} = \frac{52.8}{0.8} - 12$$

Mean of the original marks = 54

Standard deviation of the standardised marks = $\sqrt{\dfrac{S_{tt}}{n}} = \sqrt{\dfrac{7.3}{28}} = 0.5106...$

Standard deviation of the original marks = $\dfrac{0.5106...}{0.8} = 0.64$

a.   A1
B1 Original Mean = 54
M1 Using Stt / n
A1 cao

4.

$45 = 2u + \dfrac{1}{2}a2^2$ $\Rightarrow$ $45 = 2u + 2a$ M1 A1

$165 = 6u + \dfrac{1}{2}a6^2$ $\Rightarrow$ $165 = 6u + 18a$ M1 A1

eliminating either u or a M1

$u = 20$ and $a = 2.5$ A1 A1

[7]

5.

(a)Area of sector = (1/2)(1.2)(12^2)M1 A1

AC = (12)(tan1.2) = 30.866   M1 A1

Area of triangle = (1/2)(12)(30.866…)=185.1949…   M1 A1

Area = triangle – sector = 98.79cm^2 (2dp) M1 A1 must have units

B) AB= (1.2)(12) = 14.4   M1 A1

BD=12sin(1.2)=11.18   M1 A1

DA=12-OD = 12-12cos(1.2)=7.35…   M1 A1

Perimeter = AD+AB+BD=33.24cm   A1