TB(3A) Ch. 4 Special Lines and Centres in a Triangle

Conventional Questions

1. [16-17 Mid-year Exam #3]

The perimeter of an isosceles triangle is 28 cm and the length of one side is 6 cm. Janice claims that two different types of triangles can be formed. Do you agree? Explain your answer briefly.

(3 marks)

2. [16-17 Mid-year Exam #13]

Figure 5 shows a right-angled isosceles triangle ΔABC with $AB = BC = 10$ cm. I is the incentre of ΔABC.

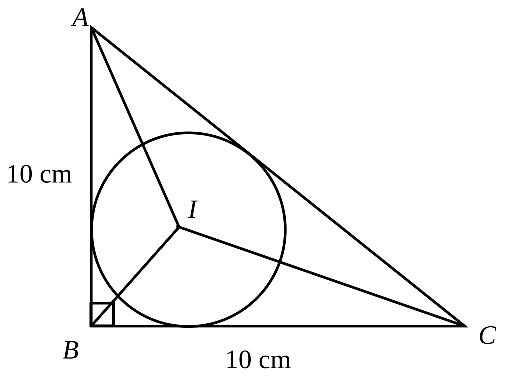


Figure 5

(a) Find $\angle ICB$. **(2 marks)**

(b) Write down the orthocentre of ΔABC. **(1 mark)**

(c) It is given that the radius of the inscribed circle is r cm, find the value of r. **(3 marks)**

3. [16-17 Mid-year Exam #14]

In **Figure 6**, $ABCD$ is a quadrilateral where $DC > AD > AB > BC$. Joseph claims that the perimeter of $ABCD$ is less than the sum of lengths of its diagonals. Do you agree? Explain your answer briefly.

(2 marks)

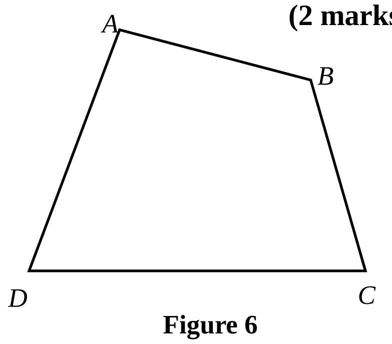


Figure 6

4. [16-17 Final Exam #18]

In **Figure 8**, I is the incentre of ΔABC, where $\angle BAC = a$, $\angle ABC = b$ and $\angle ACB = c$.

(a) Express $\angle BIC$ in terms of b and c. **(2 marks)**

(b) Hence, show that $\angle BIC$ is an obtuse angle. **(2 marks)**

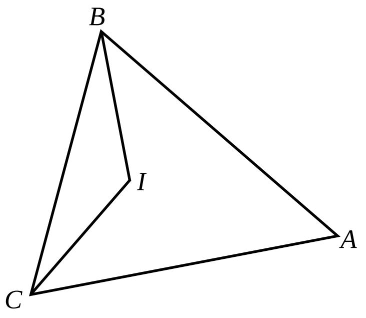


Figure 8

5. [17-18 Mid-year Exam #6]

In **Figure 2**, $ABCD$ is a trapezium with AB // DC. H is a point inside $ABCD$ such that AH and DH are angle bisectors of $\angle BAD$ and $\angle ADC$ respectively. Let $\angle BAH = x$, find $\angle AHD$.

(3 marks)

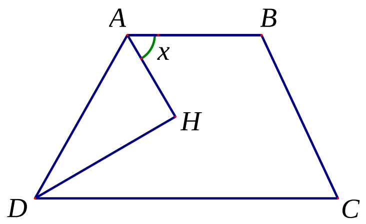


Figure 2

6. [17-18 Mid-year Exam #11]

In **Figure 6**, $ABCD$ is a parallelogram. B is the midpoint of AE. DE cuts BC at F. AF and BD cuts at G.

(a) Prove that G is the centroid of ΔADE. **(2 marks)**

(b) A student claims that the centroid of ΔBCD lies on DF.
Do you agree? Explain your answer. **(3 marks)**

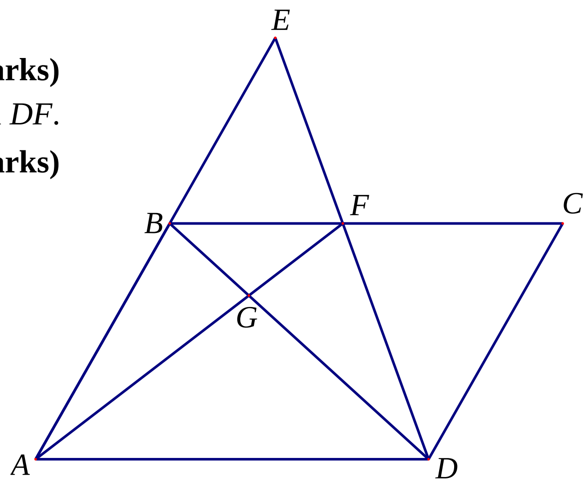


Figure 6

7. **[18-19 Mid-year Exam #5]**

In **Figure 2**, AC is an altitude of ΔABD while AD is the angle bisector of $\angle BAE$. It is given that $\angle ADC = 2\angle CAD$ and $\angle E = 20°$.

(a) Find $\angle B$. **(3 marks)**

(b) Determine whether ΔABE is an isosceles triangle. **(2 marks)**

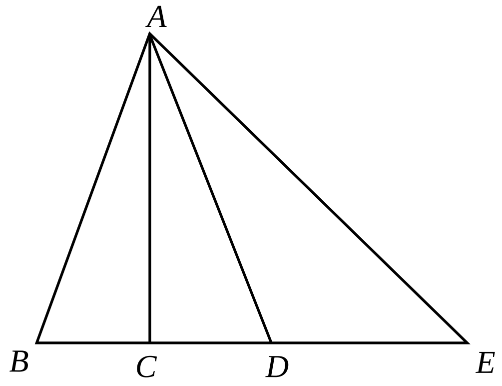
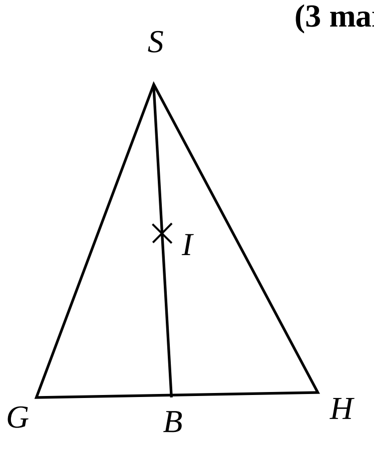


Figure 2

8. **[18-19 Mid-year Exam #6]**

In **Figure 3**, I is the incentre of ΔGHS. If $SG = SH$ and $\angle G = 40°$, find $\angle BSH$.

(3 marks)



9. [18-19 Mid-year Exam #12]

In **Figure 6**, BF is the angle bisector of $\angle ABC$. FE and FD are respectively.

(a) Prove that $FE = FD$.

(b) By considering the areas of ΔAFB and ΔCFB, prove that $\frac{AF}{FC} = \frac{AB}{BC}$. **(2 marks)**

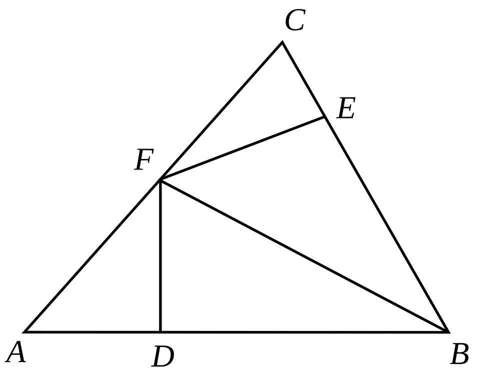


Figure 6

10. [19-20 Mid-year Exam, #11]

In ΔABC, D is a point on AC such that BD is the angle bisector of $\angle ABC$. BD is an altitude of ΔABC. A student claims that the centroid of ΔABC lies on BD. Do you agree? Explain your answer. **(3 marks)**

11. [19-20 Mid-year Exam, #13]

In **Figure 3**, $ABCD$ is a rectangle and $BEDF$ is a rhombus. BD meets EF at G. FB is the angle bisector of $\angle ABD$.

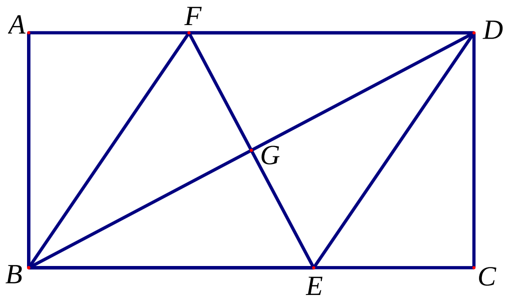


Figure 3

(a) Prove that $\Delta ABF \cong \Delta GBE$. **(3 marks)**

(b) Prove that DE is the angle bisector of $\angle BDC$. **(3 marks)**

(c) A student claims that $AF : FD = 1 : 2$. Do you agree? Explain your answer. **(2 marks)**

12. [20-21 Mid-year Exam, #6]

In **Figure 1,** $BD = CD$, $\angle ADB = \angle ADC$ and $\angle ACD = \angle DBC$.

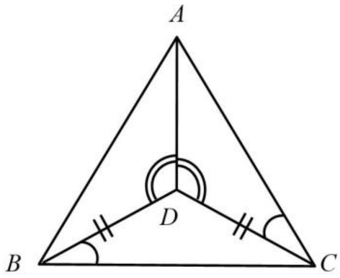


Figure 1

(a) Prove that $\Delta ABD \cong \Delta ACD$. **(2 marks)**

(b) Prove that D is an incentre of ΔABC. **(2 marks)**

(c) If AD is produced to meet BC at E, prove that AE is the perpendicular bisector of BC.

(2 marks)

~ End ~