

TB(3A) Ch. 4 Quadrilaterals

Conventional Questions

1. [14-15 Mid-year Exam #7]

In **Figure 3**, $EBFD$ is a rectangle. A and C are points on EB and DF respectively such that $\angle BAD = 2x - 20^\circ$, $\angle BCD = x + 50^\circ$ and $\angle ADC = 60^\circ$.

- (a) Find the value of x . (2 marks)
- (b) Prove that $ABCD$ is a parallelogram. (3 marks)
- (c) Prove that $\triangle AED \cong \triangle CFB$. (2 marks)

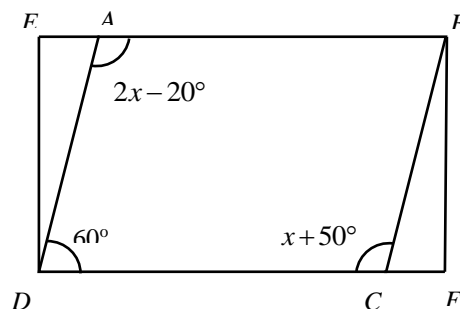


Figure 3

2. [14-15 Mid-year Exam #8]

In **Figure 4**, ADB , AEC and BEF are straight lines. $AD = DB$, $DE \parallel BC$, $\angle DEB = \angle BFC$ and $DE = 5$ cm.

- (a) Find BC . (2 marks)
- (b) Find CF . (2 marks)

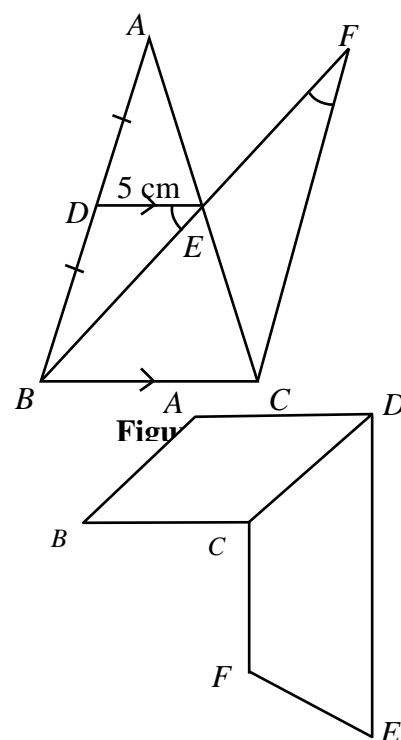


Figure 4

3. [14-15 Mid-year Exam #13]

In **Figure 5**, $ABCD$ is a rhombus and $CDEF$ is an isosceles trapezium. $DE = 2CF$ and $\angle BCF = 90^\circ$. If the perimeters of $ABCD$ and $CDEF$ are the same, find $\angle CBF$. (3 marks)

4. [14-15 Final Exam #7]

In **Figure 3**, $ABCD$ is a rhombus. The diagonals AC and BD intersect at F . It is given that E is the mid-point of AD , $DF = 6$ cm and $CF = 8$ cm.

- (a) Find CD . (2 marks)
- (b) Find EF . (2 marks)

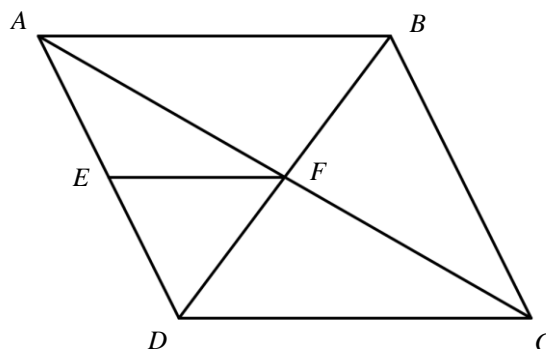


Figure 3

5. [14-15 Final Exam #15]

In **Figure 8(a)**, $ABCD$ is a parallelogram. E, F, G and H are points on DA, AB, BC and CD respectively. It is given that $\triangle AFE \cong \triangle CHG$.

- (a) By considering $\triangle EDH$ and $\triangle GBF$, prove that $EFGH$ is a parallelogram. (4 marks)
- (b) In **Figure 8(b)**, AC meets EF and HG at points M and N respectively. AC, BD, FH and EG meet at O . Prove that $MFNH$ is a parallelogram. (2 marks)

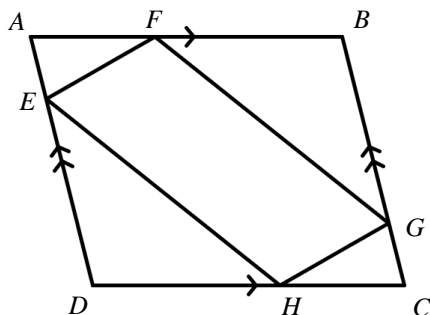


Figure 8(a)

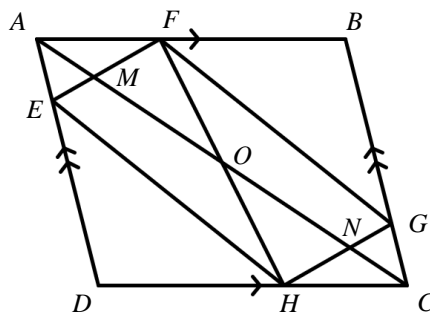


Figure 8(b)

6. [15-16 Mid-year Exam #2]

In **Figure 1**, $ABCD$ is a rhombus. AC and BD intersect at E . It is given that $AE = 2x$ cm and $BE = x$ cm. If the perimeter is 80 cm, find the value of x . (3 marks)

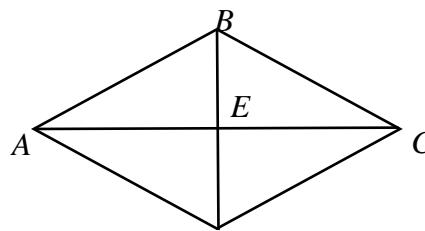


Figure 1

7. [15-16 Mid-year Exam #5]

In **Figure 2**, C is the mid-point of AD and $BC \parallel ED$. If $BC = (2x - 2)$ cm and $ED = (3x + 5)$ cm, find the value of x . (2 marks)

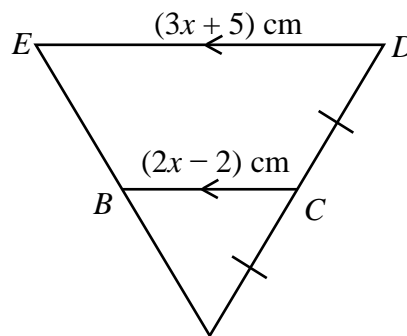


Figure 2

8. [15-16 Mid-year Exam #6]

In **Figure 3**, $ABCD$ is a square. AE and BD intersect at G . DC and AE extend to meet at F . It is given that EC is the median of $\triangle DEF$ and $\angle F = 30^\circ$.

- (a) Prove $\triangle CDE \cong \triangle CFE$. (2 marks)
- (b) Find $\angle GDE$. (2 marks)

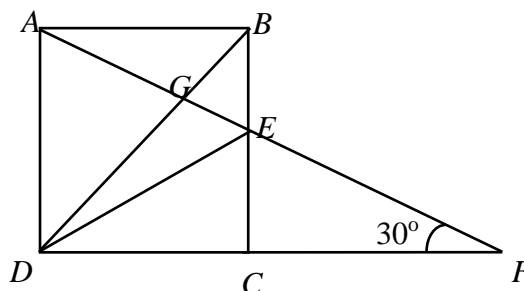


Figure 3

9. [15-16 Mid-year Exam #10]

In **Figure 6**, $ABCD$ is a parallelogram. It is given that $BF \perp AC$ and $DE \perp AC$. Prove that $BEDF$ is a parallelogram. (4 marks)

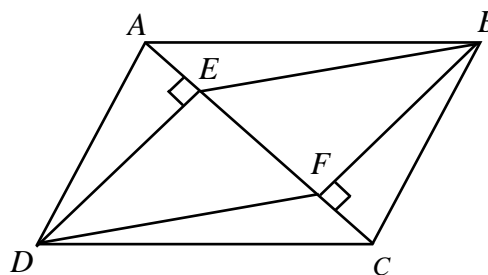


Figure 6

10. [15-16 Mid-year Exam #12]

In **Figure 7**, $ABCD$ is a rhombus and its diagonals AC and BD intersect at M . O is the incentre of $\triangle ABC$. EOC is a straight line. Prove that $\angle BEC = 3\angle BCE$.

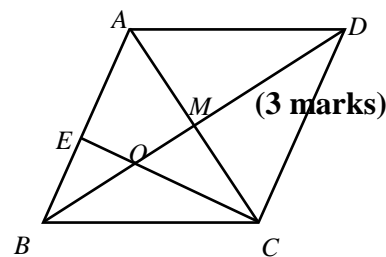


Figure 7

11. [15-16 Final Exam #11]

In **Figure 5**, $BEFD$ is a parallelogram. D , E and F are the points on AB , BC and AC respectively, such that FD bisects AB . Prove that $BE = CE$. (3 marks)

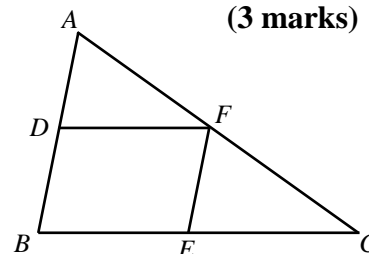


Figure 5

12. [15-16 Final Exam #14]

In **Figure 7**, $ABCD$ is a square and $CDEF$ is a rhombus. BDE is a straight line. CD and BF intersect at M . Prove that FB is an angle bisector of $\angle EBC$. (3 marks)

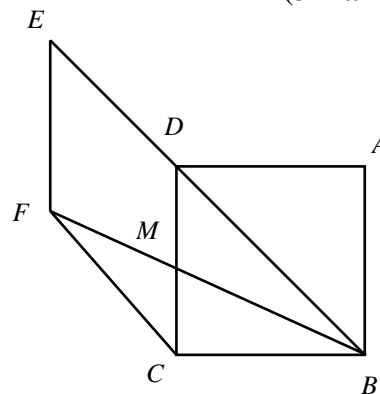


Figure 7

13. [15-16 Final Exam #19]

In **Figure 11**, AR and BS are the medians of $\triangle ABC$ and intersect at M . PS and PQ are the medians of $\triangle ASM$ and $\triangle BPM$ respectively. Prove that $PQRS$ is a parallelogram. (3 marks)

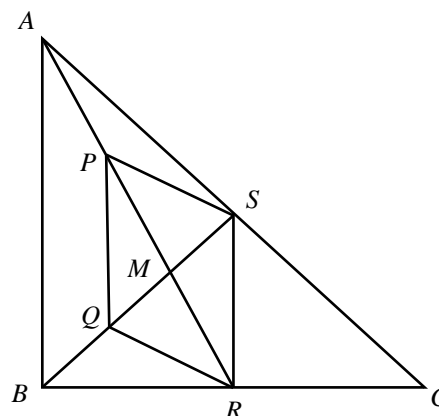


Figure 11

14. [16-17 Mid-year Exam #5]

In **Figure 1**, $ABCD$ is a quadrilateral. $\angle BAC = \angle ACD = 60^\circ$, $\angle B = 80^\circ$ and $AB = DC$.

(a) Prove that $ABCD$ is a parallelogram. (2 marks)

(b) Find $\angle D$. (1 mark)

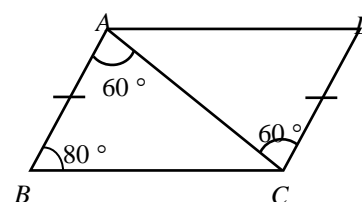


Figure 1

15. [16-17 Mid-year Exam #6]

In **Figure 2**, ABC and ADE are straight lines. It is given that $AD = DE$, $BD \parallel CE$, $AB = (x + 5)$ cm and $BC = (2x - 1)$ cm. Find x .

(2 marks)

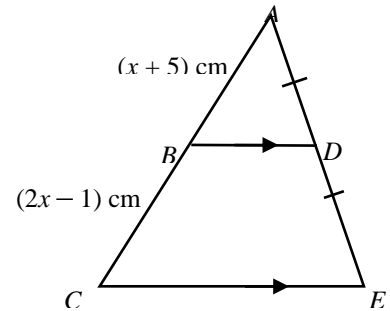


Figure 2

16. [16-17 Mid-year Exam #7]

In **Figure 3**, D and E are mid-points of AB and AC respectively.

(a) Prove that $DE \parallel BC$ and $DE = \frac{1}{2} BC$. (1 mark)

(b) (i) Prove that $\triangle BCG \sim \triangle EDG$. (2 marks)

(ii) Find $BG : EG$. (2 marks)

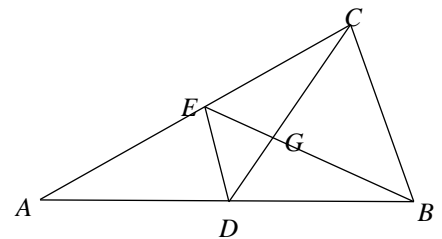


Figure 3

17. [16-17 Final Exam #14]

Figure 4 shows parallelogram $ABCD$, where $AM = MB = DQ = QC$, $BP = PC = 8$ cm and $BD \parallel MN$.

(a) Find AN . (2 marks)

(b) Prove that $MNQP$ is a parallelogram. (2 marks)

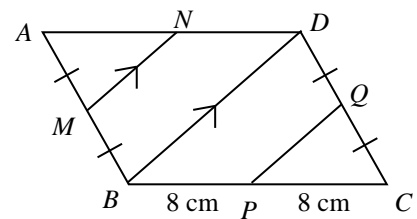


Figure 4

18. [16-17 Final Exam #15]

Figure 5 shows a quadrilateral $PQRS$, where PR and QS are perpendicular bisectors to each other.

- (a) Name the type of quadrilateral $PQRS$ belongs to. (1 mark)
- (b) (i) Express the area of the quadrilateral $PQRS$ in terms of PR and SQ . (1 mark)
- (ii) Find the percentage change in the area of the quadrilateral if PR is increased by 10% and SQ is decreased by 25%. (2 marks)

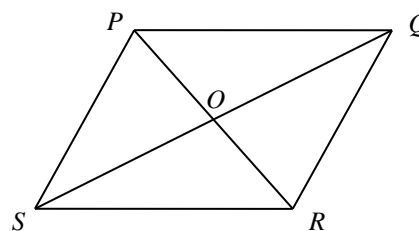


Figure 5

19. [17-18 Mid-year Exam #5]

In Figure 1, $ABCD$ is a parallelogram. Find the value of x .

(2 marks)

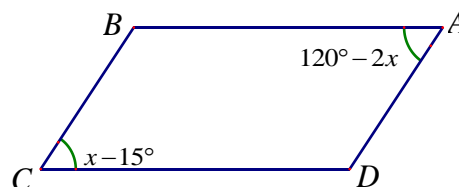


Figure 1

20. [17-18 Mid-year Exam #7]

In Figure 3, $ABCD$ is a rhombus. E and F are points on BC and AD respectively such that $\angle ABF = \angle CDE$.

- (a) Prove that $\triangle ABF \cong \triangle CDE$. (3 marks)
- (b) Show that $BFDE$ is a parallelogram. (3 marks)

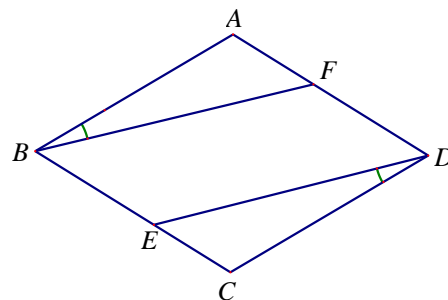
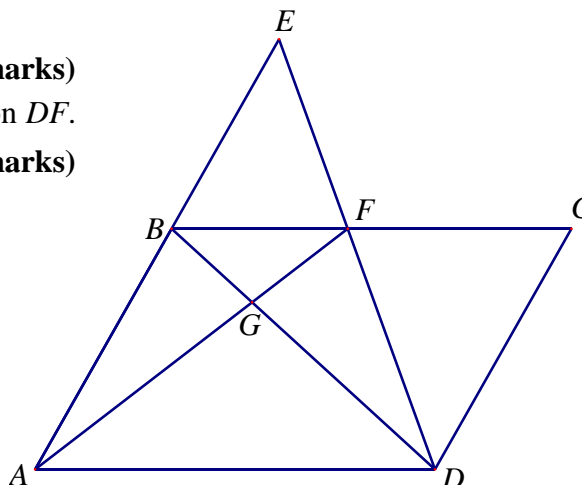


Figure 3

21. [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 $\triangle ADE$. (2 marks)
- (b) A student claims that the centroid of $\triangle BCD$ lies on DF .
Do you agree? Explain your answer. (3 marks)



22. [17-18 Mid-year Exam #12]

In **Figure 7**, $ABCD$ is a rectangle while $DEFG$ is a square. AGF is a straight line. If $CD = DE = 10$ cm and $BC = 20$ cm, determine whether $ABDG$ is a trapezium. Explain your answer. (2 marks)

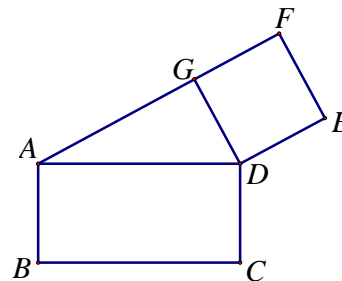


Figure 7

23. [17-18 Final Exam #6]

In **Figure 2**, ACE and BDF are straight lines. It is given that $AB \parallel CD \parallel EF$, $AC = CE$, $BD = DF$, $AB = 26$ cm and $CD = 17$ cm. Find EF . (3 marks)

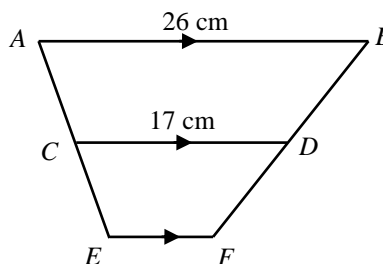
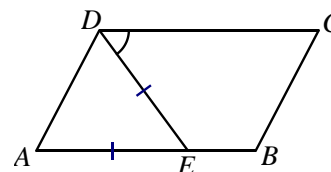


Figure 2

24. [18-19 Mid-year Exam #4]

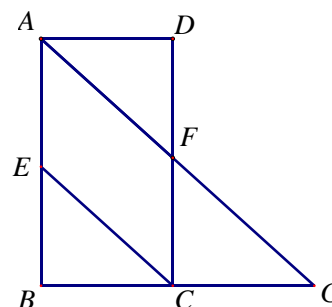
In the figure, $ABCD$ is a parallelogram. E is a point lying on AB such that $AE = DE$. If $\angle ABC = 112^\circ$, find $\angle CDE$. (3 marks)



25. [18-19 Mid-year Exam #11]

In the figure, $ABCD$ is a rectangle. BC is produced to G such that $BC = CG$. AG cuts CD at F . E is a point on AB such that $\angle AFD = \angle BEC$.

- (a) Prove that $\triangle ADF \cong \triangle CBE$. (2 marks)
- (b) Prove that E is the mid-point of AB . (3 marks)
- (c) Prove that $CEFG$ is a parallelogram. (3 marks)



26. [18-19 Final Exam #10]

In **Figure 3**, $ABCD$ is a parallelogram. BDE is a straight line. It is given that $AB = 3$ cm, $AF = 9$ cm, $DE = 5$ cm, $EF = 3$ cm and $\angle CDB = \angle DAB$. Prove that $ABEF$ is a parallelogram.

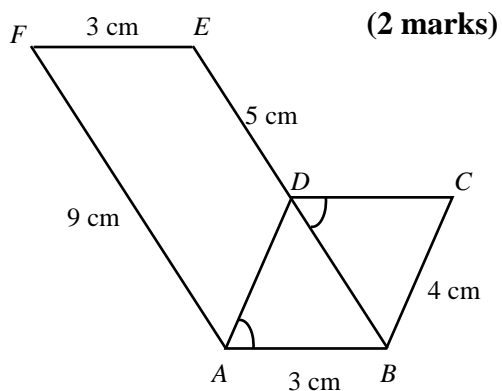


Figure 3

27. [18-19 Final Exam #12]

In **Figure 5**, it is given that $BD \parallel CG$, $AB = BC$ and $CF = FG$. BG cuts AF at E .

- (a) Prove that $\triangle BDE \sim \triangle GFE$. (2 marks)
- (b) Find $BD : CF$. (2 marks)
- (c) Hence, or otherwise, find $AE : EF$. (3 marks)

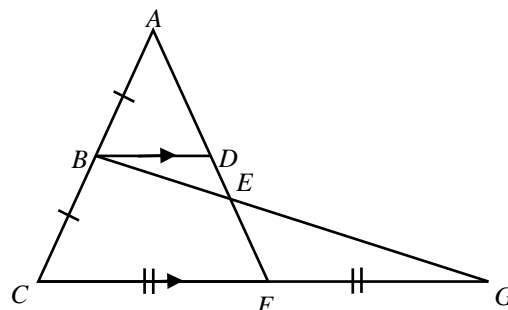


Figure 5

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