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Key

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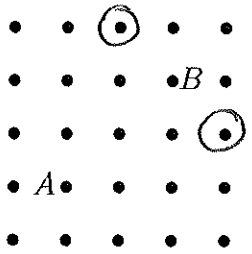
Math 118 - Dr. Miller - Exam #2 - 3/26/14

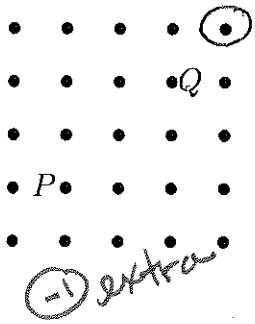
1. (a) *[2 pts]* In the first grid, circle all possible points C that would make $\angle ABC$ a right angle.

   (b) *[2 pts]* In the second grid, circle all possible points R that would make $\angle PQR$ a straight angle.

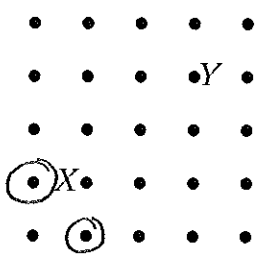
   (c) *[2 pts]* In the third grid, circle all possible points Z that would make $\angle YXZ$ an obtuse angle.

-1 extra -1 lost





-1 extra

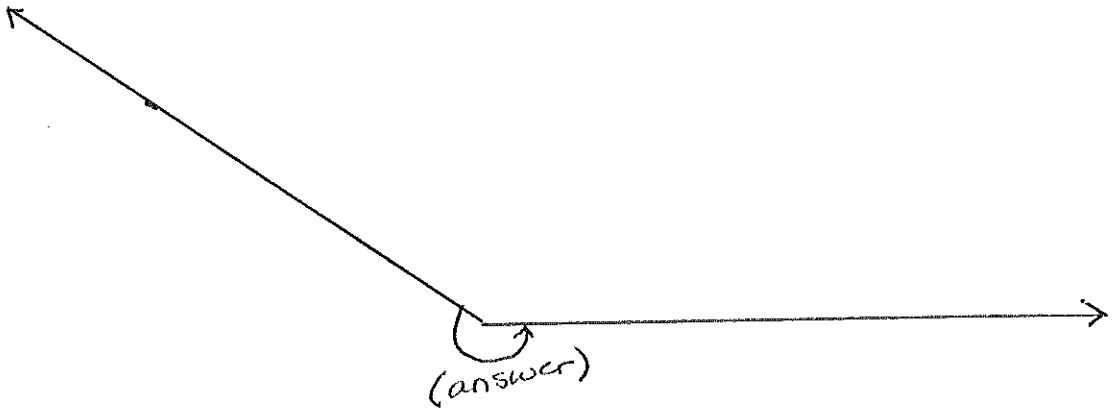


-1 XYZ instead

2. *[2 pts]* Use your protractor to draw an angle measuring 214^o. Clearly indicate your answer.

$$\begin{array}{r} 214^\circ \\ -\,180^\circ \\ \hline 34^\circ \end{array}$$

-1 326°



med = 75.5

3. *[8 pts]* How many different diagonals does a 160-gon have? Verbally explain as thoroughly as possible the mathematical reasoning for why this is true. (If you use a formula, you must explain the mathematics that makes it the correct formula to use; do not simply explain HOW to use it.)

total

(2) Each vertex can begin/create 157 diagonals.

(2) We know it's 157 because you would be able to connect that one vertex with all other vertices except the 2 it's already joined to and, of course, itself.

(2) So 160 vertices creating 157 diagonals apiece gives $160 \times 157 = 25,120$ diagonals.

(2) But this product accidentally counts each diagonal twice: once at each of its endpoint vertices.

So we deride by 2 to correct for the overcounting: $\frac{25120}{2} = 12,560$ diagonals altogether.

4. *[6 pts]* In a certain heptagon, all of the interior angle measurements are equal except for one angle, which is five times as big as any of the others. What is the measurement of each small angle, to the nearest tenth? Show clear work.

(2) 7 sides, 7 vertices, make 5 Δs

$5 \cdot 180^\circ = 900^\circ$ interior total

(1) LHS $x + x + x + x + x + 5x = 900^\circ$

(6 small angles; 1 big angle)

(3) eqn to solve

$11x = 900^\circ$

$x = 81.8^\circ$

for each small angle

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5. *[8 pts]* A convex polygon has an interior angle total that is more than $50,000°$. What is the SMALLEST value that the total could equal? Justify your answer.

n sides, n vertices, n-2 Δs

$(n-2)\cdot 180°$ total

(-2) 280

(-4) diagr w/o ÷2.

$$\frac{(n-2)\cdot 180^\circ}{180} = \frac{50{,}000^\circ}{180}$$

$$n-2 = 277.8$$

$$n = 279.8$$ sides needed to "hit" $50,000°$ exactly

But a decimal # of sides isn't possible, so we'd need 280 sides to go just over $50,000°$.

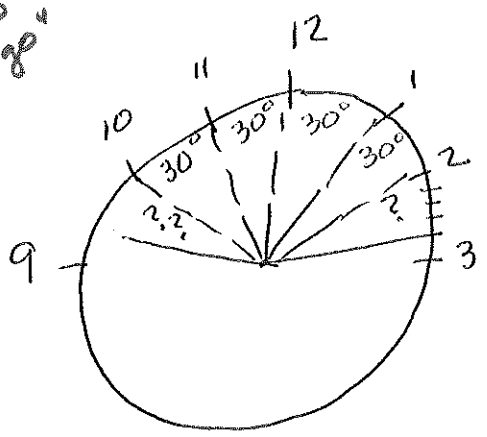
280 sides, 280 vertices, 278 Δs:

$278 \times 180° = \boxed{50,040°}$ smallest we can make.

6. *[8 pts]* Find the measurement of the non-reflex angle formed by the hands of a working clock at 9:14. Round to the nearest tenth if needed; show clear work.

(4)

(1) idea of "to go"
(2) no "to go"



Our angle:

$4 \times 30°$ + part minute hand HAS GONE + part hour hand HAS TO GO

4 minutes $= 4 \times 6° = 24°$

$\frac{14}{60}$ gone, $\frac{46}{60}$ to go,

$\frac{46}{60} \times 30° = 23°$

Total:

$120° + 24° + 23°$

$\boxed{= 167°}$

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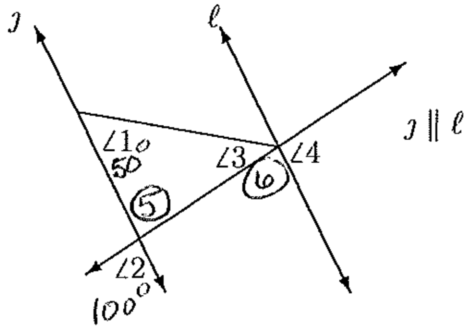
7. *[8 pts]* In the diagram, $\jmath \parallel \ell$, $m(\angle 1) = 50^o$, and $m(\angle 2) = 100^o$. Find $m(\angle 3)$ and $m(\angle 4)$, justifying each with a short explanation. You should label and discuss additional angles if needed.



m(∡5) = 100° because ∡2 + ∡5 are vertical angles.

m(∡3) = 30° because ∡1, ∡3, + ∡5 are in a triangle

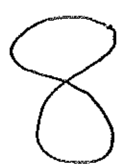
m(∡6) = 100° because ∡2 + ∡6 are corresponding angles

m(∡4) = 80° because ∡6 + ∡4 are supplementary angles / are a linear pair

8. *[20 pts - 2-4 each]* Draw clear examples of the following; IF NOT POSSIBLE, say so. When relevant, mark your examples to clearly show:

- Congruent sides or angles marked the same; non-congruent ones marked differently.
- Right angles marked ¬; acute angles labeled < 90°; obtuse angles marked > 90°.
- Parallel sides marked with matching arrows.

(a) a curve that is not simple but is closed (no markings required)
3 2 1



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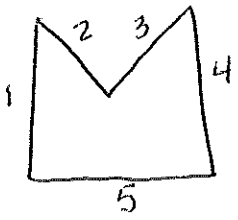
(b) a concave pentagon (label the sides with "1," "2," etc.)

3 2 1

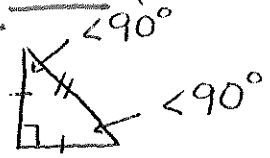


(c) an equilateral polygon that is not equiangular (mark as in instructions)

4 2 2

(d) a right triangle that is isosceles (mark as in instructions)

3 1 2



(e) an equilateral triangle that is obtuse (mark as in instructions)

2

not possible
(an equil. Δ would have all 60° angles inside — no chance for obtuse ones)

(f) a kite that is not a rhombus (mark as in instructions)

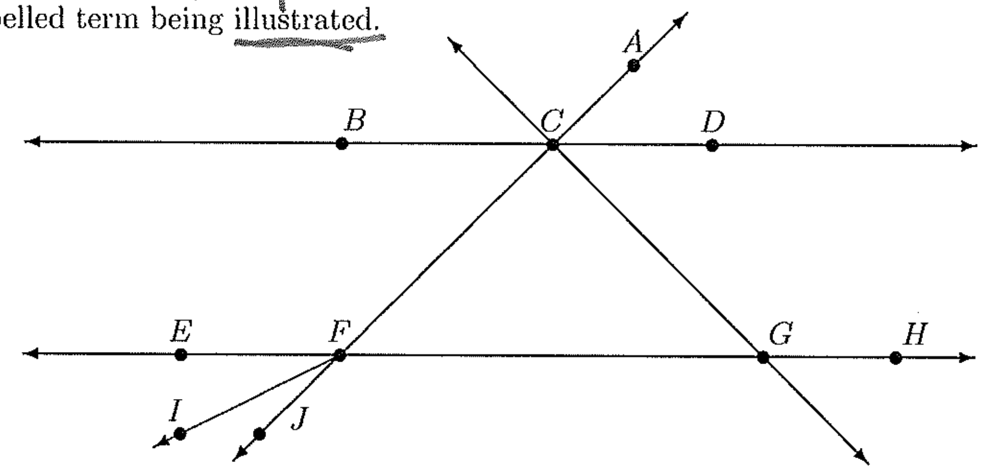
3

2

(g) a square that is not a parallelogram (mark as in instructions)

not possible
(the opposite sides in a square are always parallel)

9. *[10 pts - 2 each]* Refer to the diagram below to fill in each blank with the correctly spelled term being illustrated.



(a) $\angle BCF$ and $\angle ACD$ are a pair of VERTICAL angles.

(b) $\overleftrightarrow{AJ}$, $\overleftrightarrow{CG}$, and $\overleftrightarrow{BD}$ are CONCURRENT lines.

(c) C is the VERTEX of $\angle ACD$.

(d) $\angle EFJ$ appears to be a(n) ACUTE angle.

(e) $\overleftrightarrow{AJ}$ and $\overleftrightarrow{CG}$ appear to be PERPENDICULAR lines.

10. *[14 pts - 2 each]* Fill in each blank with the correctly spelled term that is being defined.

(a) A(n) DODECAGON is a polygon having twelve sides.

(b) A(n) LINE is a set of points extending infinitely in two opposite directions.

(c) A(n) (ANGLE) BISECTOR is a ray that divides an angle into 2 congruent halves.

(d) SUPPLEMENTARY angles are (two) angles whose measurements total 180°.

(e) A(n) RAY is made up of 1 point on a line together with all points to one side of it (on the line).

(f) A(n) RECTANGLE is a 4-sided polygon having all four angles congruent.

(g) A(n) TRAPEZOID is a 4-sided polygon having exactly one pair of parallel sides.

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10pts

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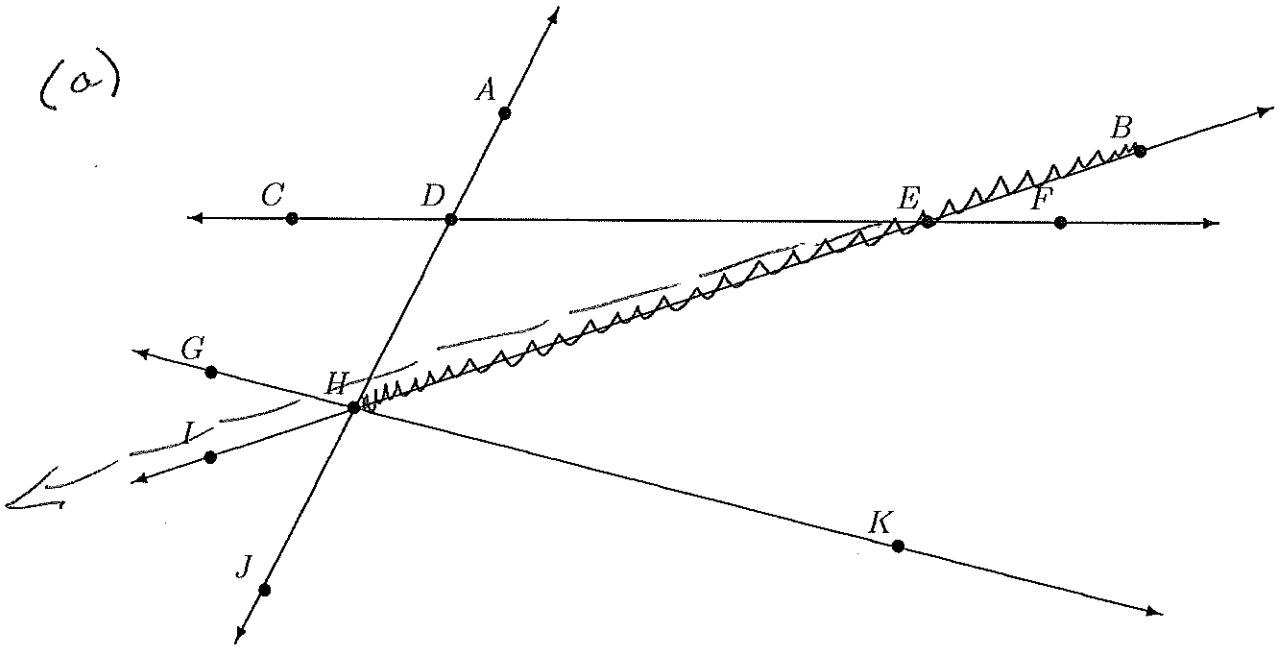
11. Refer to the diagram (extra copies are provided - staple them to your exam). Use correct notation to write the name of each of the following:



(-1) $\overleftrightarrow{BI}$ (-1) $\overrightarrow{EI}$

(a) $\overline{HB} \cup \overrightarrow{EI}$ = $\overrightarrow{BI}$ (also same ray: $\overrightarrow{BE}$ or $\overrightarrow{BH}$)

(-1) another pt

(b) $\angle CIE \cap \overleftrightarrow{AJ}$ = H

(-1) $\measuredangle BDE$

(c) $\overrightarrow{BD} \cup \overrightarrow{BE}$ = $\measuredangle DBI$ (other names for same angle: $\measuredangle IBD$, $\measuredangle DBH$, $\measuredangle DBE$, $\measuredangle HBD$, or $\measuredangle EBD$)

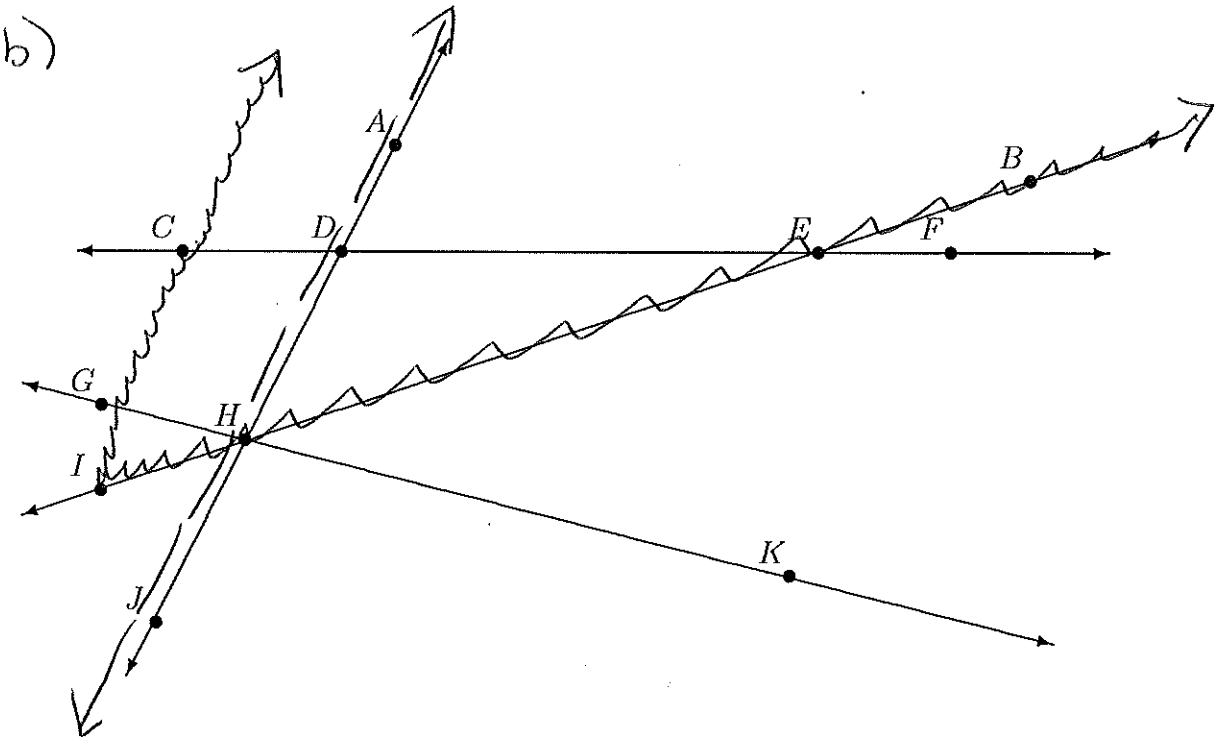
(-1) $\overline{EH}$ (-1) $\overrightarrow{HB}$ or $\overrightarrow{BH}$

(d) $\angle GHE \cap \overrightarrow{BE}$ = $\overline{BH}$ (also named $\overline{HB}$)

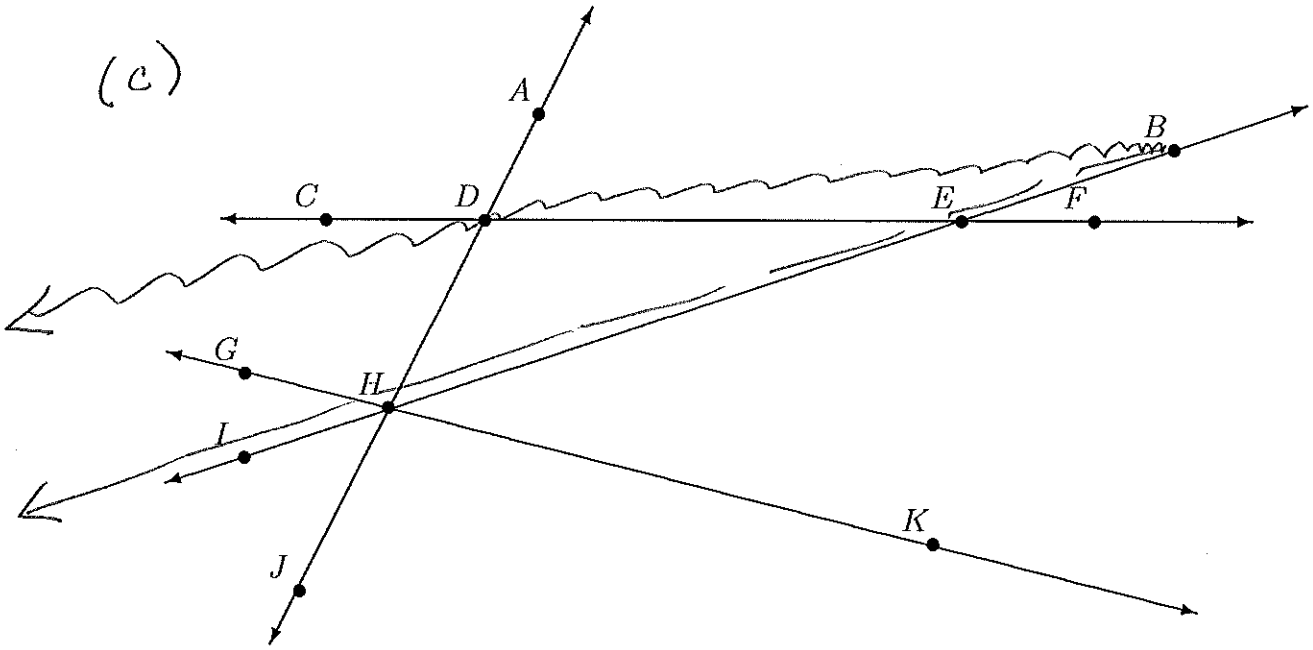
(-1) $\overline{DE}$

(e) $\angle JDF \cap \angle EDA$ = $\overrightarrow{DF}$ (also named $\overrightarrow{DE}$)

(b)



(c)



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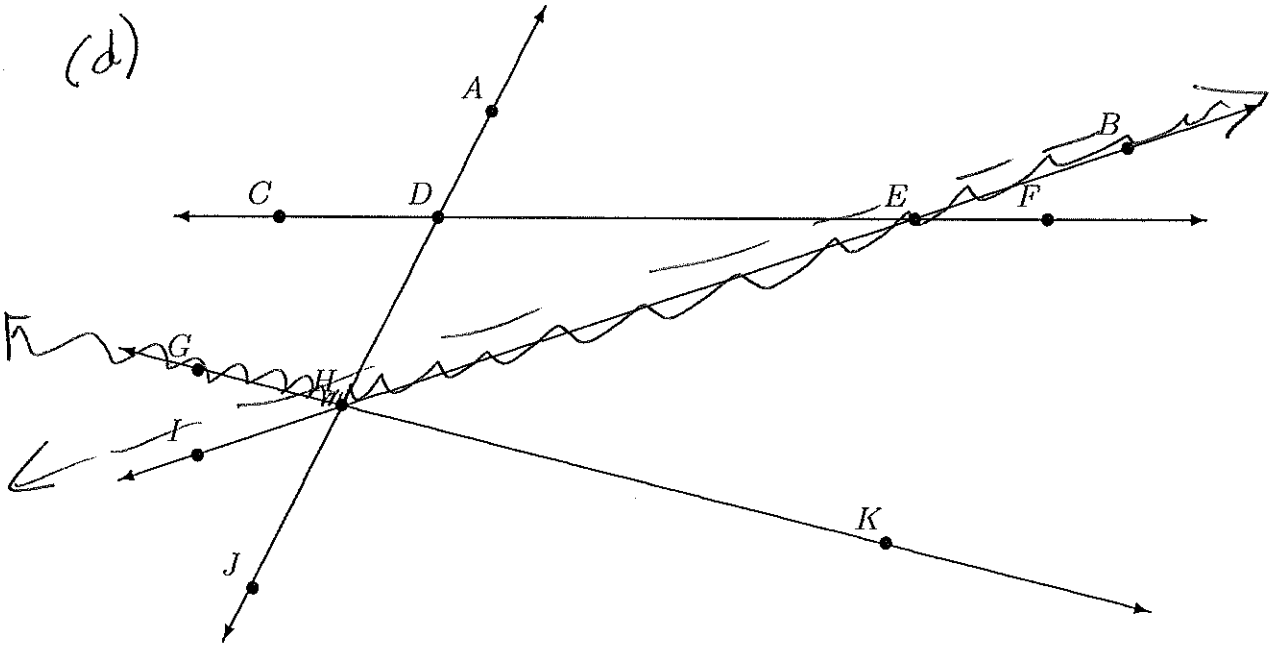
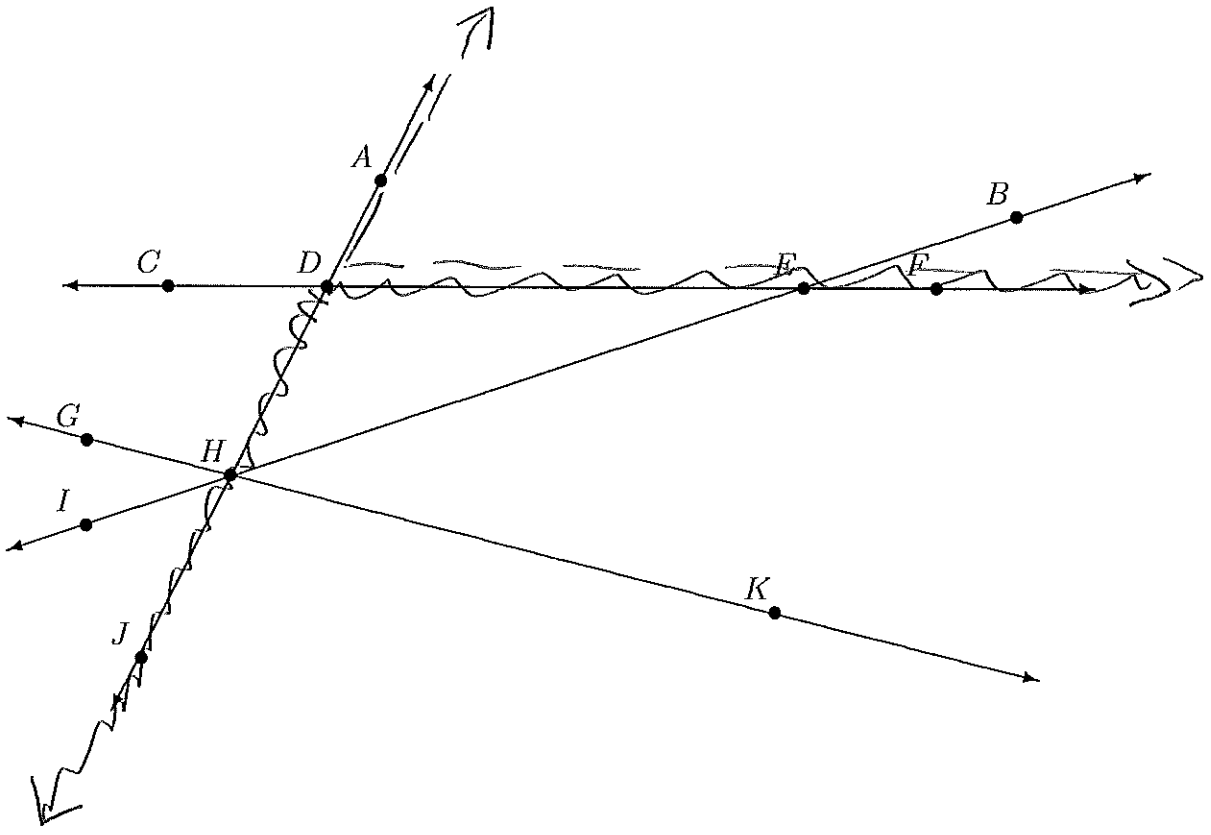
(d)



(e)



Calculators are permitted, but —
- they may NOT be cell phones
- they may NOT have text-based memory (so no graphing calculators)

Protractors are needed. They are in the back cupboards.

If students take yellow sheets, staple to back of exam (even if unused).