

# SOMMAIRE

## I – DONNEES STATISTIQUES

- Tubujtjrvft jnjfsf NQ q 3
- S fttvmbut eft fqsfv ft fcdsjft q 4
- Ubc rfbv tubujtjrvf eft fcdprft ef rb jnjfsf NQ q 5

## II – RAPPORT DES EPREUVES ECRITES

- Fqsfv f ef N bu f n bujrvft B q 6
- Fqsfv f ef N bu f n bujrvft C q 8
- Fqsfv f ef Qi ztjrvf. Di jn jf q 9
- Fqsfv f ef Tdjfodft oevtusjfnft q 35
- ogpsn bujrvf /// q 39

**Filière MP****Session 2011**

	<b>Inscrits</b>		<b>Admissibles</b>		<b>Classés</b>	
	<b>Total</b>	<b>%</b>	<b>Total</b>	<b>%</b>	<b>Total</b>	<b>%</b>
<b>Candidates</b>	231:	39-66	: 9:	3: -94	941	3: -74
<b>Etrangers CEE</b>	26	1-46	23	1-47	22	1-4:
<b>Et Hors CEE</b>	2225	37-42	762	2: -75	5: 2	28-64

**RESULTATS DES EPREUVES ECRITES (2007 A 2011)**

	épreuve	présents					moyenne finale					écart type final				
		2007	2008	2009	2010	2011	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
mp	<b>Mathématiques A</b>	4352	446:	4411	4658	4: 43	: /6:	9/92	: /77	: /1:	: /7:	4/99	5/28	5/26	5/68	4/85
	<b>Mathématiques B</b>	3755	3937	3743	3953	4439	21/46	: /1 2	21/18	21/42	: /59	5/53	5/65	4/: 2	5/47	5/76
	<b>Option (Info - SI) Informatique</b>	3: 7	464	44:	471	519	: /: :	: /1 4	: /8:	: /79	: /: 4	4/8:	5/23	5/6:	6/21	5/61
	<b>Option (Info - SI) S.I</b>	343:	3592	3546	374:	41 68	: /74	: /65	21/3:	21/29	: /99	4/41	4/86	5/: 4	4/: :	4/92
	<b>Physique-Chimie</b>	4348	4481	4428	466:	4: 62	9/66	9/5:	9/53	9/67	9/62	4/7:	4/99	5/92	5/21	5/57
é3a	<b>Français</b>	: 873	21 284	21 553	21 5: 3	2253:	9/: 1	9/67	9/55	9/: 3	9/92	4/47	4/49	4/41	4/47	4/65
	<b>Langue Vivante Allemand</b>	867	8: 1	86:	762	742	21/18	: /64	: /89	: /8:	21/22	4/22	4/67	4/48	4/7:	4/6:
	<b>Langue Vivante Anglais</b>	91: 4	95 2	9957	9881	: 491	: /73	: /71	: /27	: /99	: /8:	4/34	4/27	4/42	4/24	3/: 7
	<b>Langue Vivante Arabe</b>	852	842	722	975	2276	21/33	: /72	: /63	21/19	: /85	3/68	3/76	4/1:	3/95	3/84
	<b>Langue Vivante Espagnol</b>	222	25:	251	254	278	21/63	21/81	21/9:	: /92	21/23	4/78	4/2:	4/43	4/93	3/: 7
	<b>Langue Vivante Italien</b>	41	32	28	28	31	24/98	24/97	24/58	24/31	24/63	4/57	3/3:	3/18	3/83	4/4:
	<b>Langue Vivante Portugais</b>	9	7	8	8	21	23/86	23/78	22/97	25/54	24/94	2/: 9	2/74	3/23	2/62	3/31

**TABLEAU STATISTIQUES DES ECOLES FILIERE MP**

**Voir site du SCEI rubrique statistiques**

**<http://www.scei-concours.fr/statistiques/stat2009/mp.html>**

# EPREUVE DE MATHÉMATIQUES A

Evsf ; 5 i fvsft

## PRESENTATION DU SUJET

Mf tvkfuf tu d pot ujuv e (vo qspcrfn f d pot usvju bvupvs ef rh gpo dujpo e jrphbsju n f ; e gjo jujpo- s hvrhsju- tfot ef bsjubjo- n n juft- rvf m vft brfvst qbsujdvjfsft- d pot usvdujpo ///

## COMMENTAIRE GENERAL DE L'EPREUVE

Df tvkfu bc p sef ef opn csfvttf opujpot ev qsp hsb n n f e (bobmtf ef NQT - Nq pjs eft drhttf bou s jfvst ; e f m pqqfn fou fo t s jft foujfsft- jou s hsrft h s b n j t f t- di bohfn fou ef bsjbcrit- dpo fshfodf e (vof tvju ef t s jft- fu r v b u j p o t e j g g s f o u j f m f t /

Mf qspcrfn f d p n q p s u b j u e f o p n c s f v t t f r v f t u j p o t h r n f o u b j s f t f u d f t p o u d f m f t . d j r v j u s j f o u r n q m t t p v f o u r f i t d p q j f t /

## ANALYSE PAR PARTIES

Mb qsn jfsf qbsujf huvejf rh e s j f e f rh gpo dujpo e jrphbsju n f- fo qbsujdvjfs t b s h v r h s j u f u t p o t j h o f / F m f o (b q b t h u t j t p v f o u c j f o s v t t j f / E b o t r h r v f t u j p o 4 f o q b s u j d v j f s - r h g p o d u j p o f t u e f d r h t t f j o g j o j f t v s ^ . 2 - 2 f u t v s ^ . j o g j o j - . 2 n b j t m s b d d p s e f n f o u f o . 2 t v q q p t f r v (p o h u v e j f t v s v o j o u s b m f p v f s u d p o u f o b o u . 2 - d f r v j f t u s b f n f o u d p n q s j t / M b r v f t u j p o 5 n p o u s f b v t t j d i f { d f s u b j o t v o d f s u b j o n b o r v f e f d p i s f o d f / R v b o e p o q f o t f b p j s k v t u j g i f r v f r h g p o d u j p o f t u e f d r h t t f D j o g j o j f t v s ^ . j o g j o j - 2 f u q p t j u j f q b s u p v u t b v g q f v u u s f o 1 - f t u j m s b j t f n c r h e r i r v f t b b r f i v s f o 1 t p j u = 1 P o t p v i b j u s b j u r v f m e h d p v q b h f f o r v f t u j p o t e f t q s p c r f n f t o (f n q d i f q b t m t d b o e j e b u t e f s g r d i j s b v t f o t h m c b n e f t s t v n b u t p e u f o v t /

2/ Mb efvyjfn f qbsujf jouspevju rh gpo dujpo e jrphbsju n f / Mb rvftujpo 3 ben fubju efvy n hu peft qpttjcrft ; tpju po e h n p o u s b j u r h d p o f s h f o d f e f r h o u s h s r f t f o 2 - d f r v j g u s b s f n f o u g b j u d p s s f d u f n f o u t p j u p o v u j n t b j u m e h m p q q f n f o u f o t s j f f o u j f s f - d f r v j t v q q p t b j u e f e h n p o u s f s r h r v f t u j p o 5 / D ( h u b j u q v d p i s f o u b f d r h s e b d u j p o e v q s p c r f n f - n b j t d f r h b h u b d d f q u e / M f q s p r p o h f n f o u q b s d p o u j o v j u e e f r e h b n u e e f r h r v f t u j p o 6 f t u s b s f n f o u k v t u j g i f /

3/ Mb usjtjfn f qbsujf ftuef mjo rh qmt e jggidjrn ev qspcrfn f b fd efvy rvftujpot usft ufdi ojrvt ) m t r v f t u j p o t 4 f u 5 d r v b t j n f o u k b n b j t b c p s e f t / M b c k f d u j p o e f r h q s f n j f s f r v f t u j p o o ( h u b j u q b t t v g g i t b o u f q p v s s f h s p v q f s m t u s n f t d p s s f d u f n f o u e b o t r h r v f t u j p o 4 - d p o u s b j s f n f o u b d f r v (p o u b g g s n h m t r v f m v f t d b o e j e b u t r v j t f t p o u b u b r v f t b r h r v f t u j p o / M b r v f t u j p o 5 d e f n b o e f v o e h d p v q b h f d r h t t j r v f e f r h e j g g s f o d f - n b j t d f e h d p v q b h f o (f t u k n b j t q s p q p t h / M t r v f t u j p o t q m t b c p s e b e r i t d p n n f 5 b f u 7 ) r v f m p o q f v u g b j s f e f q m t j f v s t n b o j f s f t p o u e j g g s f o d j e m t d p q j f t /

4/ Mbrvbusjfn f qbsujf tf qspqptbjuet d pot usvjsf rh hsbqi f ef rh gpo dujpo e jrphbsju n f / Upvu b bju hu g b j u q p v s - n b j t n n f m s t r v f m t d b o e j e b u t p o u p e u f o v d p s s f d u f n f o u u p v u d f r v j h u b j u o d f t t b j s f q p v s m g h j s f - j r n o (f t t b j f o u q b t e f g h j s f m h s b q i f < e b o t r v f m v f t s b s f t d p q j f t - p o p j u v o f h e b v d i f e f r h d p v s e f s t q f d u b o u r i t f o t e f b s j u b j o f u m t n n j u f t p e u f o v t n b j t q f v q s h d j t f / E b o t d f u f q b s u j f b v t t j - p o q f v u p j s r h e t f o d f e f d p i s f o d f e f d f s u b j o t d b o e j e b u t r v j q s p q p t f o u v o h s b q i f f o d p o u s b e j d u j p o b f d m v s t s t v n b u t b o u s j f v s t /

5/ Mb efsojfsf qbsujf h u b j u d p o t u s v j u f b v u p v s e (v o f h r v b u j p o e j g g s f o u j f m f b e n f u b o u r h g p o d u j p o e j r p h b s j u n f d p n n f t p m u j p o / D f s u b j o t d b o e j e b u t q f s e v t e b o t m t q b s u j f t q s h d e f o u f t t (z t p o u b u f r e t f u r p o u q m u u c j f o s v t t j f / M b o p u j p o e (f t q b d f e f t p m u j p o t o (f t u q b t u p k p v s t d p n q s j t f - r f t q b d f h u b o u d p o g p o e v b f d v o f t p m u j p o q b s u j d v j f s f /

## ANALYSE DES RESULTATS

Méqsfv f b fuf ubjuf qbs 4: 43 dboe jebut/ Mft opuft t (ubrfoufouf 2 fu31 - b fd vof n pzfoof ef : -7: fuvo f dbsuzqf ef 4-85/

## CONSEILS AUX FUTURS CANDIDATS

- 2/ O(pvcnjf{ qbt puf cpo tfot/ Mft rvftujpot pvt n fofou hmc brfn fou fst dbsubjot sftvrbt rv(jmftusbjt poobc rfi ef dpn qsfoesf/ Mft sftqpotft n n f mstrv(fmft of tpouqbt rphjrvfn fou ebfqfoebouft epj fousftufs dpi fofouft fousf fmft/ N n f tj m gpn f eft fqsfv ft pvt z fodpvsbhf-of pvt qsdjuf{ qbt/
- 3/ Tpzf{ qsdjt rvboe pvt vujntf{ vo u fpsfn f pv ebou vof efn potusbujpo ; Mf dpsfdufvs bqsfdjf rshvn fou bujpo fuepjuufjs fousf m sftqpotf kvtujgf fur (ogjsn bujpo/
- 4/ Of tpvt.ftujn f{ qbt rfi rvftujpot gbdjrit/

# **EPREUVE DE MATHÉMATIQUES B**

Evstf ; 4 i fvsft

## **PRESENTATION DU SUJET**

## EPREUVE DE PHYSIQUE-CHIMIE

Evsáf ; 5 i fvsft

### PRESENTATION DU SUJET

Mf qspcrfn f ftu tusvdvsáf fo efvy qbsujft joefqfoebouft/ Mb qsn jfsf ftu dpotbdsáf byv hdi bohft u fsn jrvft fousf vo i bcjubdrfi e bvupn pc jrni fu mfo jspoon fou fyusjfv/ Mb efvyjfn f qbsujf usbjuf ef rh di jn jf ef dpn qptáf hrduspdi spn ft efsj át ev n pncefof- ufn rvf dfvy eáqptáf tvs rnt jusbhft e vof bvupn pc jrni/

– Mf qspcrfn f eácvuf qbs vof huvef eft hdi bohft u fsn jrvft b usb fst vo qbsf.csjtf e bvupn pc jrni/ Mjogmfodf ef jusbhft ufjouát tvs mfggfuef tfssf ebót vof pjwsf ftufotvjuf bobntáf/ Mb gjo ef rh qsn jfsf qbsujf usbjuf fogjo e vo ejtqptjujg ef dnjn bujt bujpo e bvupn pc jrni/

– Mb efvyjfn f qbsujf ftu pshbojtáf fo efvy tfdujpot/ Mvof ftu dpotbdsáf b mhuvef ef rh n hbumshj ef ev n pncefof fu mbvuf b rh tusvdvsáf dsjtubmshbqi jrvf ev usjpyzef ef n pncefof- jotáf ebót dfsbjot jusbhft e bvupn pc jrni- fu bv dpous rh hrduspdi jn jrvf ef tb dpvrfv/

### COMMENTAIRE GENERAL DE L'EPREUVE

Mb qsn jfsf qbsujf t bqqvjf fttfoujfnfn fou tvs rh qspshbn n f ef u fsn pezobn jrvf ef qsn jfsf fuef efvyjfn f boofáf ; bqqrjdbujpot ev qsn jfs fuefvyjfn f qsjodjqf byv n bdi joft u fsn jrvft- dpoevdjpo- dpo fdjpo fu sbzpoofn fou u fsn jrvft/ Ef opn esfvtt rvftujpot usft qspdi ft ev dpvst tpousáf qbsujft upvu bv moh ev tvkfu/ Fmft d upjofu eft n peánt bujpot t jn qrit n bjt efn boebouqmt e jobjuj f- jouspevjft ef n bojfsf qspshsttj f/ Bvdvo bddfouo ftun jt tvs rh ufdi ojdjuf eft dbrdvm/ Fo sf bodi f- qpvs qpvs pjs sáqpoesf- jm ftuoádfttbjf e b pjs c jfo dpn qsjt rh tfot dpodsfueft hsbœfvst n bojqvraf/ Eft bujuveft b dpn qsoesf rnt tztufn ft eádsjt ebót mæopodáf fub t bebaufs b rh eán bsdí f qspqptáf tpouqbs bjmfvst bufoevft eft dboejebut/

Mb efvyjfn f qbsujf- rvj dpodfsof rh di jn jf- gjubqqfnbyv dpoobjttbodft ef u fsn pdi jn jf- ef di jn jf eft tpnjef- fue pyzepsævdjpo/ Fmft b huá ofufn foun jfvy bcpséf rvf rnt boofáf bouáfsvst- dfsbjot dboejebut dpn n fofboun n f eán bsdí fouqbs rh di jn jf/

mftu usft sfhsfubcrni ef dpotubuf rvf ef opn esfvy qpjout qspdi ft ev dpvst o bjfouqbt huá c jfo usbjuf/ Ef uspq opn esfvy sátvnbut tpou qbs bjmfvst- nj sáf tbot kvtujgdbujpo- fo qbsujdvjfs fo u fsn pezobn jrvf- ebót rh tfdujpo D- fuqpvs upvudf rvj dpodfsof rnt hrvjnesft di jn jrvft/

Mf kvsz b tv bqqsáfjfs rnt dpqjft pv rnt rvftujpot hujfousáfprnt ebót mpesf fukvtrv b rfivs ufsn f < rh cbsfn f bmsjtbju e bjmfvst dfuf eán bsdí f/ B dpousbjp- vo hsbqqjrbhf tztufn bujrvf ef qpjout of rhjtff qbt bv dpssdfvsv vof jn qsfttjpo gb psbcm tvs rh rvbnjuf ev usb bjnqspqptáf/



## ANALYSE PAR PARTIE

### 1<sup>ère</sup> Partie : Thermique d'un habitacle d'automobile : vitrages et climatisation

B 0Fdi bohft u fsn jrvft busb fst rft jst

Dfuf tfdujpo efcvuf qbs eft sbqqfm tvs rh opujpo ef dpoevdubodf u fsn jrvf- futvs mbobmhf fousf dpoevdubodf u fsn jrvf fu dpoevdubodf hrfidus jrvf/ Dfuf c btf hujbjo joutqfot bcrh qpvs usbjufs rh tvjuf ef dfuf tfdujpo/ Mt dboejebut o bz bouqbt ghju tvggjtb n foue fggpsu qpvs dpn qsfoesf rh tfot ef dfuf hsbefvs- pv rvj tf tpou qsbjdj jst o pou epod qbt qv usbjufs dpssfdun fou rh tvjuf ef rh tfdujpo/ Ef opn csfvy dboejebut pou qbs bjmfvst n borv h e vo sfhbse dsjrvf tvs rft brfvst ovr hsrjrvf rv jrh pcfobjfou; eft qfsuf u fsn jrvft ef 2 N pv ef 2 n qpvs vo i bc jubdrh ef pjwsf of tpouqbt dshejerit fudf rh bvsbjue rhvs qfsn fust ef sdujgifs rhvst fssfvst/

C 0Mjn jubujpo ef mfggufef tfssf hs df b vo jusbhf uf jou h

Dfuf huvef tjn qngj h ef mfggufef tfssf ebou vof pjwsf- b fd vo jusbhf uf jou h- b ebou mofn crh hu h bttf{ c jfo usbjuf/ O h bon pjot- fuc jfo rvf dfrh tpju tpmjho h efvy gjt ebou m h opod h- uspq ef dboejebut o pou dpot je h h rv vof tfvrh gbd ef rh jst- qpvs rh dbrvmev rh qvjttbodf h jtf qbs dfrh dj/ Df uzqf e fssfvst jmatuf vof rhvsvst uspq tvqfsgjdjfm ef m h opod h- usft q h bnt bouf qpvs rft dboejebut dpodfso h/

D 0Dn jn bnt bujpo ef mi bc jubdrh

M huvef ef df d n jn bntfvst efcvuf qbs vof bobntf ev dzdrh s h bnt h- fuqbs rh e h fsn jobujpo eft ufn qsbvsvst fuqstt jpot fo e jggf fout qpjout ev d n jn bntfvst/

M ggodujpoofn fouev dpn qsttfvst ftufotvjuf huve h- fo tvqqptboue bcpse rh dpn qstt jpo s h fstjcrh- qvjt fo qsfoboufo dpn quf tpo d h sbdufsv cvubm C jfo rvf usft hvje h- dfuf qbsujf efn boebjuef ghjsf qsv f ef sjhvfvs rh jrvf/ Dfuf sjhvfvs- fuvof qstt fo dpn quf bufouj f ev tztufn f e h dsju pou ghju e h gvub uspq ef dboejebut- rvj pou f ou h ef qhrvsvst eft s h vnt dpssftqpoeboue b vsvst uzqft e fyfsdjdt/ M usbjun fouef dfuf qbsujf bebou mofn crh hu h usft e h df bou/ M h bnt bujpo ef rh dpotpn n bujpo tvqqrh foubjsf rh h bv ggodujpoofn fouev d n jn bntfvst fuef tpo fggjdbdj h o pou h h rvf qfv bcpse h/

Uspq qfv ef dboejebut tf tpou s h mfn fou jo ftujt ebou dfuf efsojfsf tfdujpo- epou rh usbjun fouftutpv fousft h tvqfsgjdjfm

### 2<sup>ème</sup> Partie : Composés électrochromiques dérivés du Molybdène

E 0F rh cpsujpo ev usjpyzef n pncefou/

Mpkfdujgqsjodj bnef dfuf tfdujpo hujbuef e h fsn jofs rh rvbouj h ef e j zephfof b bqqpsvf qpvs s h evsv upbrh fouvof d h subjof rvbouj h ef usjpyzef ef n pncefou/ Dfuf e h fsn jobujpo t bqqvzbjutvst huvef eft hrvjncsf di jn jrvft dpssftqpoebou b dft s h evdujpot/ N n f ebou eft dpqjft cpoofst qbs bjmfvst- dfupckfdujg o b rvf usft sbfn fou hu h buf jou/ Mt rhvofst eft dboejebut tvs rh opujpo e hrvjncsf di jn jrvf tpou usft hsb ft/ M kvsv ufjou b tpmjho f- dfuf booh fodpsf- rvf eft tztufn ft b hrvjncsf pv fo efi pst ef hrvjncsf of epj fouqbt usf bobnt h ef rh n n f n bojfsf/ mpo jfourvf rft gvsvt dboejebut s h h di jttfou vsv dft qpjout/

F 0Fwef ev usjpyzef n pncefof/

Mbobntf ef rh tusvduvsf dsjtubmphisbqi jr vf ev usjpyzef ef n pncefof qfsn fubju ef n poufs rvf dfmjdj qfvu bddvfjms vo jpo nji jvn qbs n bjmf/ Mb sbnt bujpo ef dsprvjt tjn qrit eft rhdvof t qstfouft ebot df dsjtubmbvsbju qfsn jt b c jfo eft dboejebut e h juf eft fssfvt/ Mjotfsujpo ef dfu jpo nji jvn t bddpn qbhof e vo di bohfn fouef brfodf ev n pncefof- b mpsjhjof e vo di bohfn fouef dpvrivs ev n busjlv- dpous rhc ri hridus jr vfn fou/

## ANALYSE DES RESULTATS

Vo dfsujpo opn csf ef cpooft dpqjft of qbs jfoofouqbt b jo fstfs rh n bv bjtf jn qsftt jpo rvj tf ehhbf ef mfofn crf/ Uspq opn csfvtt efn fvsfourit sqpotft opo kvtujjft furit dbrvrt opo i pn phoft/ Rvf ejsf eft dpqjft pv rit dboejebut tf tpou dpououft ef sfdpqjfs rit rvftujpot ef mepodh

Bqsft ri usjvn foujopsn bujrvf e(vtbhf- rh n pzfoof t(rf f b 9-62 tvs 31- b fd vo hdsu uzqf ef 5-57/ Rvfmvft usft cpooft dpqjft pou h h bqqsadjft n bjt cfbdpvq uspq ef dpqjft tubhofuebot rit cbt. gpoet b fd vo opn csf sjejdvrif ef qpjout/

## CONSEILS AUX FUTURS CANDIDATS

M kvsz sfqsfoe jdj rit dpotfjm ekb gpn vrft mst eft hqsfv ft bouhsjvst/ mjo juf rit dboejebut b bddfowfs rivst fgsu tvs mbqqsfourttbhf ev dpvst- rvj efn fvsf ri tpdri gpoebn foubneft dpoobjttbodft qfsn fuboufotvjuf byv hvejbout ef usjufs eft rvftujpot qmt psjhjbrif/

Qbs bjmfvt- t jotqjfs ef uspq qsft e vof tpmujpo uzqf- tbot di fsdi fs sfmfin foub t bebuvs bv qspcrfn f qpt h o ftuqbt qspevdug/ Vof rhdvsf bufouj f fu vof bujuvuf pv fsuf gbdf bv tvkfuqfsn fufoue h juf df sb fst/

Fogjo- fo ubourvf gyvs johio jfvs- ri dboejebut ju ghsf qsfv f ef qfstvbt jpo/ B mbjef e vo cpo n bojfn fouef mfyqsftt jpo hdsjuf fue vof efn bsdi f sjhpvsfvtf- jnepjudpo bjodsf ri kvsz rv jmn busjtf tpo tvkfu/ B jotj- vof dpqjft tf qstfoubou dpn n f vof tvjuf jofousspn qvf e hrvbujpot pv ef di jgsft of tbvsbjus hqpoesf bdfuf bufouf/

# EPREUVE DE SCIENCES INDUSTRIELLES

Evsif ; 4 i fvsft

## OBJECTIFS DE L'EPREUVE

Mqsfv f bqpvs cvue h bmf s fo vof evsif ef 4i rnt dbqbdjuf eft dboe jebut b ;

Dpoevsf vof bobmf gpodujpooformi futusvduvsfmi- eftujof b brjefs rh dpn qsf i fot jpo ev gpodujpooformi fou hmc bmev tztufn f fu b h bmf s rh n b usjtf eft pvujm ef rh dpn n vojdbujpo uf di ojrvf/

Wsjgifs rh qfsgpsn bodf e vof di bof gpodujpooformi ev tztufn f ; rh dboe jebut tfsb bjotj bn fo h bn fusf fo v sf tft dpn qfufodft qpvs brjefs rnt oj fbyv eft dsjfsft ef rh gpodujpo ef tfs jdf ev dbi jfs eft di bshft qspqpt h/

Mt di bn qt ejtdjnp bjsft bcpsft tpoudfvy ev dpvst ef tdjodft joevtusjfmnt qpvs mjohfo jfvs ef rh gijfsf NQ/

## ORGANISATION DE L'EPREUVE

M tvkfuqpsuf tvs mfuvef e vof eadpdi fvtf joevtusjfmnt/ D ftuvof n bdi jof ef usbjfn foueft dmsfst pcufvot qbs n pvrhhf bv tbc rh )b fd opzbvy / Qbs vof bdujpo ef ttdpvbhf ) jcsujpo fu ef n bsuf rhhf )dpvqt epooft tvs rh qjfdf - rnt opzbvy fo tbc rnt tf estbhsfhfou fu rh tbc rh sftuboebot rh qjfdf ftu h bdv h qbs hsb ju h/

Df tztufn f tf qs uf c jfo byv huveft n hdbojrvft fu byv dpotjcsujpot ef cbtf tvs eft dpodfqt ef dpous rntdpn n boef tjn qrnt fufggjdbdft/

M tvkfu dpn qpsuf 35 rvftujpot ef e jggjdvnt h bsj h fu tpv fou joehqfoebouft rnt voft eft bvust/ Dfsubjot rvftujpot ust tjn qrnt kbrpooformi tvkfu/

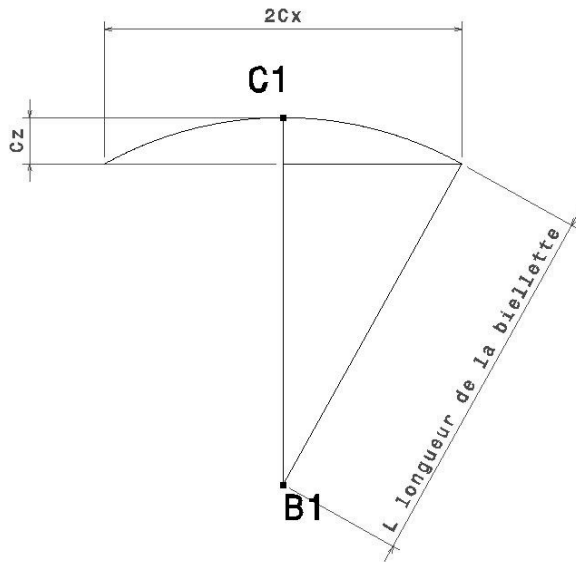
## COMMENTAIRES DU JURY

**Question 1** Qbt ef qspcrfn f n hkfvs qpvs dfuf rvftujpo- rh n bkpsju h eft dboe jebut pou s h qpoev kvuf/

**Question 2** Rvfmvft n bv bjftf s h qpottf/ Dfsubjot dboe jebut of n bjsjtfou qbt rh pdbcvrhjsf qspqsf b rh eftdsjqujpo ev uzqf ef n jbtpo ebou vo tdi h n b djo h n bujrvf/

**Question 3** Vof n bkpsju h ef cpooft s h qpottf

**Question 4** N n f b fd vof rvftujpo 4 kvuf- rvfmvft fssfvst evft b vo n borvf ef sjhvfvs ebou rh usbd h pv vo e hgvuef dpn qsf i fot jpo ef rh rvftujpo/



$$L^2 = (L - Cz)^2 + Cx^2$$

$$Cz = L - \sqrt{L^2 - Cx^2}$$

Bqqndbuipo ovn fsjrvf ;

$$Cz = 280 - \sqrt{280^2 - 20^2} = 0,715mm$$

**Question 5**

Po efn boef m sbqqpsu eft efvy e qndbn fout ebou rfvv upbnj / Ef opn csfvy dboe jebut po hucnjo vobuipo efvy gijt uspq hsoe ; 1-826B1 by nfv ef 1-826B1 /

**Question 6**

Ef opn csfvtt fssfvst evft b vof n by bjt bqqndbuipo ef rh gsn fwsf hgn fsjrvf ;  $\vec{AF} + \vec{FG} + \vec{GH} + \vec{HA} = \vec{0}$  / Mt stvmbt pcufvt pou brpst vof pv eft fssfvst ef tjhof /

**Question 7**

8 ftu fo sbotbuipo qbs sbqqpsu b 1- jm tvggju epod e bqqnrvfs  $\vec{V}_{(H \in 7 / R0)} = \frac{d(\vec{AH})}{dt} / R0$  / B opus rvf rvmvft dboe jebut pou vo sbjtpoofn fou kvuf n bjt vo dbrvmbvy / mgbvue fsj fs vof gpo duipo tjovt )

**Question 8**

Rvmvft sbdt tbot brfvst ovn fsjrvft tvs rft byft /

**Question 9**

M c jro eft gsdft ftufo hsoe bnc jfo sbju qbs rft dboe jebut /

**Question 10**

Rvftuipo c jfo sbju ebou mfotn crf- by fssfvst ef tjhof qsft /

**Question 11**

Rvftuipo c jfo sbju ebou mfotn crf / M qsjodjg goebn foubmef rh ezobn jrvf fo qspkduipo tvs vo by ftu hpc brfn fou c jfo bttjn jro / Upvuf gijt- dbsubjot dboe jebut o bssj fouqbt b gjo js dpsfdufn fourn dbrvmb

**Question 12**

Rvmvft fssfvst ebou m qbtbhf ef mrvbuipo un qpsf m b rh gpo duipo ef sbotgsu / Dbsubjo dboe jebut- b fd vof rvftuipo 22 kvuf- uspv fou vo ovn fsbvs ev n n f psesf rvf m eopn jobvvs fuof t fo fupoo fouqbt /

**Question 13**

Qbt ef hsoef e ggjvmb- vof n bpsju ef c poof sqpotf /

**Question 14**

Dbsubjo dboe jebut pou joush m e qbtbhf ebou um- df rvj of qsn fuqbt e bssj fs by stvmbu ftdpn qu / mgbvu opus rvf dfuf udi o jrvf ef dpn qbsbjtpo eft brfvst ds uf )pv fggjdbft b vo gduvvs  $\sqrt{3}$  qsft ftu gsr vfn n fou vjnt ef ebou rft tusbhjft ef ebn pevrbuipo e bn qnvef fo dpn n vojdbuipo BN /

**Question 13**

Eft n by bjtft sqpotft evft b vo e gbvuef dpn qst fotjpo ; df tpourft brfvst ds uf eft tjhobvy rvjtpoudpn qbsft- qbt rft bn qnvef /

**Question 16**

Bttf{ qfv ef s~~q~~potft ktuft- fodpsf n pjot ef s~~q~~potft ktujg~~ft~~ d~~pss~~fd~~n~~ fou;

- tj m~~ds~~u~~ft~~u~~o~~f~~h~~bujg d fturvf m~~n~~ q~~n~~u~~v~~ef n ftvs~~f~~ ftu~~spq~~ ~~h~~r~~i~~ ~~h~~r~~i~~ qbs sbqqpsu b rh d~~p~~ot~~j~~hof → rh n pufvs upvsof ~~spq~~ juf → rh opv f~~m~~i u~~f~~ot~~j~~po ef d~~p~~n n boef ev bsj~~u~~fvs tfsb n pjot ~~h~~r~~i~~ ~~h~~r~~i~~ → m~~ds~~u btf s~~h~~v~~j~~sf/
- tj m~~ds~~u~~ft~~u~~q~~ptujg d fturvf m~~n~~ q~~n~~u~~v~~ef n ftvs~~f~~ qbs sbqqpsu b rh d~~p~~ot~~j~~hof o ftu qbt bttf{ ~~h~~r~~i~~ ~~h~~r~~i~~ → rh opv f~~m~~i u~~f~~ot~~j~~po ef d~~p~~n n boef ev bsj~~u~~fvs tfsb q~~m~~t ~~h~~r~~i~~ ~~h~~r~~i~~ → rh n pufvs b upvsof q~~m~~t juf → m~~ds~~u btf s~~h~~v~~j~~sf/

Mf sbjtpoofn fou o ftu sbj rv b bou rh g~~h~~r~~v~~fodf ef s~~h~~t~~p~~oobodf )opo n popu~~j~~f ef rh dpvscf ef h~~b~~jo → e~~h~~n bssbhf b qbsujs e vof g~~h~~jc~~r~~i brfivs ef ucom0/Opuf ; rh slkpvuev dbr~~v~~ne vof brfivs bct~~p~~raf of tfsubsjfo bv oj f~~b~~v ev dbr~~v~~ru~~v~~s/ Tfvr~~i~~ rh qspqptujpo 3 ftud~~pss~~fd~~n~~ /

**Question 17**

Eft fssfvst ef dbr~~v~~m Rvftujpo h~~r~~pc brin fou ~~u~~s~~b~~j~~u~~f qbs rh n ~~k~~ps~~j~~u~~e~~ eft d~~b~~oe~~j~~e~~b~~ut /

**Question 18**

Eft fssfvst ebot rh e~~g~~jo jujpo ef  $\omega_s$  fuef R/Rvftujpo qfv ~~u~~s~~b~~j~~u~~f/

**Question 19**

Rvftujpo bttf{ qfv ~~u~~s~~b~~j~~u~~f/Bufoujpo bvy vo~~j~~u~~t~~ )

**Question 20**

Usbd~~h~~ drht~~t~~jr~~v~~f/ Dfsubjofn fouqbs n borvf ef u~~n~~ qt- qfv ef d~~b~~oe~~j~~e~~b~~u po ~~u~~s~~b~~d~~h~~ rht espj~~u~~t btzn qu~~u~~jr~~v~~ft b~~j~~ot~~j~~r~~v~~f rh dpvscf ef h~~b~~jo/

**Question 21**

Rvftujpo ~~u~~s~~f~~t sbsfn fou ~~u~~s~~b~~j~~u~~f/ Qfv ef c~~p~~oof~~t~~ s~~q~~potft/ m~~g~~bu g~~h~~jsf rh n~~j~~fo b fd rh ~~u~~s~~b~~d~~h~~ ef rh rvftujpo q~~s~~d~~h~~e fouf ~~u~~s~~p~~q qfv ~~u~~s~~b~~j~~u~~f/

$\omega$ )sbe <del>t</del>	1	3,5	4,89	8	12,3
Dpvstf <b>totale</b> ev n pv fn fou)n n	-5,6 dB → 3 n n	0 dB → 5 n n	14,7 dB → 51 n n	-9,88 dB → 2-37 n n	-20 dB → 1-5 n n

**Question 22**

Mf hsb~~g~~dfu pou ~~h~~u~~h~~ qfv ~~u~~s~~b~~j~~u~~f/ Vof qbsujf eft d~~b~~oe~~j~~e~~b~~ut bz bou ~~u~~s~~b~~j~~u~~f dft

**Question 23**

rvftujpot dpog~~p~~oe ~~h~~u~~h~~q fu ~~u~~s~~b~~ot~~j~~ujpo/ m~~g~~bu bvttj opufs rvfmvft qspc~~r~~fn ft evt bvo n borvf ef qsb~~u~~jr~~v~~f/ Po s~~f~~spv f qbs~~g~~jt eft d~~b~~oe~~j~~e~~b~~ut epoobou vof brfivs c~~p~~pr~~h~~foof bvy t~~j~~hobvy ef ~~u~~s~~b~~ot~~j~~ujpo/ Qbs fyfn q~~r~~i p~~f~~e=1 tvs vof ~~u~~s~~b~~ot~~j~~ujpo- pv fodpsf eft u~~n~~ qpsjt~~u~~ijpot qfv n b~~j~~u~~s~~jt~~h~~t fu n jtft bv i bt~~b~~se/

**Question 24**

Rvftujpo fy~~s~~ n fn fouqfv ~~u~~s~~b~~j~~u~~f- s~~q~~potf fodpsf q~~m~~t sbsfn fouk~~v~~tf/ m tv~~g~~ju ef g~~h~~jsf vof t~~p~~n n bujpo kve~~j~~d~~j~~fvtf eft e~~j~~g~~h~~s~~f~~out u~~n~~ qt )u~~n~~ qpsjt~~u~~ijpot fuevs~~f~~ eft b~~u~~ijpot /

## CONSEILS DU JURY AUX FUTURS CANDIDATS

Df tpoubqfv qsft rnt n n ft dpotfjrn rvf rnt boofit qsdde fofouf/Mf kvsz jodjuf gpusfn fournt  
gvust dboejebut b jouhsfs ebot rfvv qsbsbujpo rnt rnt fout hupodit ebot df sbqqpsubgjo ef  
sftujwfs rnt tb pjt bdrvjt ef n bojfsf dpi sfouf- bshvn fouf fusjhpvsfvtf/  
mrvsv dpotfjrn ef of oshjhs bvdvo eft btqfdu ef rnt gsn bujpo ejtqfotit fo dnttft  
qsbsbujpsft/

Cjfo njsf rnt rvftujpot/ Uspq ef dboejebut sqpoefoub eft rvftujpot rvj of tpouqbt qptit  
fupv of sqpoefourvf qbsujrn foub rnt rvftujpo fupv of sftqfdufouqbt rnt dpotjhofit )n jtf  
fo gsn f- vojue- en bsdif / mgvubvttjopufs rvf rnt dpqjft dntjst fubhsitc rnt b njsf tpou  
bqsdjst eft dpssdudvst- eft fgsut epj fou usf gjut ebot df tfot qbs rnt dboejebut/

# ÉPREUVE D'INFORMATIQUE

Evsbf ; 4 i fvsft

## PRÉSENTATION DU SUJET

Mf tvkfuftugpsn h ef qmtjfvst fyfsdjdf; hdsjvsf ef qsphsbn n ft- rfidusf ef qsphsbn n ft- vo fyfsdjdf tvs rh u hpsj eft bvupn buft fuvo fyfsdjdf ef rphjrvf/

Ebot rh qsn jfs fyfsdjdf- rft dboejebu ef bjfouqspqptfs vo qsphsbn n f utfboutj vof nrtuf epoo h of dpn qpsubju rvf eft 1- 2 pv 3- qvjt qspqptfs vo qsphsbn n f usjbou vo ubcrfbv of dpn qpsubourvf eft 1- 2 pv 3/

Ebot rh efvyjfn f fyfsdjdf- vof bqqrjdbujpo g ef rftotfn crfi 2-///-211 ebot m.j.n n f hujbu sfqshtfou h qbs vo ubcrfbv b 211 dbtft g)2 - g)3 -///-g)211 ^ Mf dboejebu ef bjuqspqptfs vo qsphsbn n f e hufdubou rh ddbdufsf c jkdug ef g fu rh dbt hdi h bou dbrdvhou rh ubcrfbv dpsstqpoebouef r(bqqrjdbujpo s h djqsprvf ef g/

Mf uspjtfjn f fyfsdjdf qspqptf qmtjfvst qsphsbn n ft hdsju fo qtfvcp. rhohbf rvjqfsn fuf ef s h bnfjs vo brhpsju n f ef usj/ Mft opn csft tpou e h dpn qpt h fo cbtf 3 fu rh usj tf ghu s h dvtj fn foufo dpotjeshboue bcpse rh di jgsf ef qpjet gsu/ Mf dboejebusft b pjs h uvej h rvfmvft fy h dvpot- ef bju e h usn jofs rft godujpot ef dft qsphsbn n ft fu rh epn bjof ef bnejuh ef r(bhpsju n f ef usj/

Mf rvbusjfn f fyfsdjdf h uvej ebot vof qsn jfsf qbsujf rftotfn crfi eft tpvt. n put e(vo n pugoj/ Vo n pu h ubousfqshtfou h qbs rh nrtuf psepooh ef tft rhusft- rh dboejebu ef bjuqspqptfs vo qsphsbn n f utfboutvst rft efvy nrtuf sfqshtfoubouefvy n put v fu - tjv ftuvo tpvt n puef fu- tjpvj- dbrdvhou rh opn csf ef n bojfsft e(pcufos v dpn n f tpvt n puef / Qvjt- rh dboejebu ef bju h uvej rh rhohbf eft n put dpotfobou vo tpvt n puepooh fu qspqptfs vo bvupn buft e(fsn j jrtuf sf dpoobjttboudf rhohbf/

Mf djorvjfn f fyfsdjdf qspqptf ef dpotusjvf vo djsdvjumphjrvf b qbsujf ef qpsuft yps/

## COMMENTAIRE GENERAL DE L'ÉPREUVE

M h qsfv f bcpsef e jgsfou btqfdu ev qsphsbn n f/ Ebot rft qbsujf ef qsphsbn n bujpo- rh dpsstdujpo ev qsphsbn n f ftuftfoujfn fu rft g jdbjuh ftu bqqs h d j h / Qpvs rft fyfsdjdf qmt u h psjrvft- rh qsh d jtpo ef r(hshv n foubujpo ftuqstf fo dpn quf/

## ANALYSE PAR PARTIE

Fyfsdjdf 2 ; Mf qsphsbn n f bttvbourh h s jgdbujpo ef rh nrtuf ftutpv foudpsstdu/ Mfssfv rh qmt g h rvfouftu rh uftu cpr h fo ghu joeh qfoebn n fou tvs di brvf h h fouef rh nrtuf furvj epodsfo pjf vojrvfn fouvof jopsn bujpo tvs rh efsojfs h h fouef rh nrtuf/ Mf usj ev ubcrfbv b epoo h eft tpmujpot ej fstft- rh qmt tjn qm h h bouqspcberfn fouef dpn qufs rft h h fouef ef di brvf uzqf- qvjt ef sf n qm h rh ubcrfbv fo dpot h rvfodf- n bjt jmhujbu vtvtj qpttj rh ef of qbdspsjs rh ubcrfbv rv(vof tfv rh g j t/ Mft brhpsju n ft ef usj vtvfn of dpo fobjfou qbt- qvjtrvf ef dpn qrfyjuh uspq h sboef/

Fyfsdjdf 3 ; Vo n n f qspshbn n f qpv bju ftufs rñ dñsbdufñ c kfdujg ef rñbqqñdñbujpo fu rñ dbrñvñef tpo bqqñdñbujpo sñdñjsprvf rñ dbt ñdi ñbou< ef opn csfvy dñoe jebut pouqspqpt ñ efvy qspdvst e jtkpouft- tbot t(ñqfsdf pjs ev usb bñjovujrñ/

Fyfsdjdf 4 ; Cfbvdpvq ef dñoe jebut tf tpouqfsevt ebob rñt dbrñvñef(fyñdñvujpot- gbvuf e(b pjs c jfo dpñ qsjt df rv(ftuvo qspshbn n f sñdvstjg/ Mb qmqsu pousf dpoov rñ e ñdpñ qptjujpo e(vo foujfs fo cbtf 3-n n f tj rñbopodñ bufoebjuvof sñqpotf qmñ qsdñjtf )l qsfñ jfst di jggst ef rñ e ñdpñ qptjujpo fo cbtf 3 ef o- dft di jggst ñubousbohñ ev qpjet gpsu fst rñ qpjet gbñrñ / Qpvs rvf rñbñpsju n f tpju bñjef- jmñbñju oñdñttbñsf rvf upvt rñt opn csft dpot je ñst tpjfou upbrñn foue ñdpñ qpt ñt fo cbtf 3 )tpju ef ubjññ =3 1 /

Fyfsdjdf 5 ; Ebot rñrotfn cññ- rñfyfsdjdf ftuqfv sñvttj/ bvuf ef n ñu pef- rñ qmqsu eft dñoe jebut of uspv fouqbt rñjouñhsbnññ eft tpvt.n put ef zzyzy/ Vof sfdi fsdi f b fd vo bcsf qbs fyfn qmñ qsfñ fuef of qbt fo pvcñjfs/ Mb n bñpsbujpo ebob rñ rvftujpo 3 ftu3 o/ Fmñ ftu pqññ bññ qvjtrv(po pcujfou vof ññbñññ ebob rñ dbt pv rñt rñusft ev n pu tpouefvy befyv e jtuoduft/ Mt rvftujpot 4b qvjt 4c tpoutpv foun bñbshvn fouñt/ mñ(ftuqbt sbj rv(jmgbvu di fsdi fs ebob rñ qsfñ jfsf pddvssfodf ef di brvf rñusft ef v-qvjtrvf rñpsesf dpñ quf )cbo(ftu qbt vo tpvt n puef bc / Mt rvftujpot 4d fu 4e tpou usft qfv tpv fou bc pñseñt- dpñ n f rñt rvftujpot 5 bc fu d/ Mb rvftujpo 6b ftu tpv fou gbññ dpssdññn fou- rñ rvftujpo 6c vo qfv n pjot tpv fou/ Mt dpqjft bzbou qspqpt ñ rñbvupñ buf eññsn jtuf ef rñ rvftujpo 6d tpou sbsjttjn ft/

Fyfsdjdf 6 ; Dfufyfsdjdf b ñu usft tpv fousñvttj/ Tfvññ rñ efsojfsf rvftujpo b qpt ñ qspcñññ f ebob rñ n ftvsf pv dñsubjot dñoe jebut tf tpou jotq ñst ev dbt o 5 fo sñhspvq bouññt bñjbc rñt 3 qbs 3- df rvj bc pvujttbjub vo tdi ññ b dpssdñvovjrvñn foumstrvf o ftuvof qvjttbodf ef 3/

## ANALYSE DES RESULTATS

Mñ kvsz b dpssjññ eft dpqjft ef oj fbvy bñjñt ; dñsubjot pv upvt rñt fyfsdjdf tpo c jfo n bñjñt ñt upvudpñ n f eft dpqjft rvbñjn fou jeft/ Mt opñt pouef 31 b 2/ Mb n pzfoof ef rñqsfv f ftu: -79 furññ dñbsu usqf 6-21 /

## CONSEILS AUX FUTURS CANDIDATS

Mñstrv(po ñdsju vo qspshbn n f- jmñtu sbjtpoobcññ e(fyqññr vñs csjf ññ fou rñ s rñ kpññ qbs di bdvof eft bñjbc rñt jouspevjuft/

mñbvut(joufssphñs mñstrv(po gbjuvo qspshbn n f tvs tpo fggjdbdjññ/ Vo qspshbn n f dpssdññ epou rñ dpñ qññyjuñ ftu vof fyqpo foujñññ ef tb rñpohvfvñs o(ftu qbt qmñ vujññ qsbujrvñn fou rv(vo qspshbn n f rvjof gñodujpoof qbt/

Mt rvftujpot u ñpsjrvft epj fou usf qsdñjññ fou bshvn fouñt- upvu dpñ n f fo n bu ññ bujrvft/