

**Nr identyfikacyjny**   
SP FI – …………… – 2020/2021  
 (numer porządkowy z kodowania)

**Nr identyfikacyjny – wyjaśnienie -** *symbol przedmiotu* np. BI – biologia, *numer porządkowy wynika z numeru stolika wylosowanego przez ucznia*

WOJEWÓDZKI KONKURS PRZEDMIOTOWY   
Z FIZYKI

organizowany przez Łódzkiego Kuratora Oświaty   
dla uczniów szkół podstawowych w roku szkolnym 2020/2021

TEST – ETAP WOJEWÓDZKI

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| * Arkusz liczy **13 stron** i zawiera **4 zadania,** w tym brudnopis. * Przed rozpoczęciem pracy sprawdź, czy Twój arkusz jest kompletny. Jeżeli zauważysz usterki, zgłoś je Komisji Konkursowej. * Zadania czytaj uważnie i ze zrozumieniem. * Odpowiedzi wpisuj długopisem bądź piórem, kolorem czarnym lub niebieskim. * Dbaj o czytelność pisma i precyzję odpowiedzi. * W zadaniach zamkniętych zaznacz prawidłową odpowiedź, wstawiając znak X we właściwym miejscu. * Jeżeli się pomylisz, błędne zaznaczenie otocz kółkiem i zaznacz znakiem X inną odpowiedź. * Oceniane będą tylko te odpowiedzi, które umieścisz w miejscu do tego przeznaczonym. * Do każdego numeru zadania podana jest maksymalna liczba punktów możliwa do uzyskania za prawidłową odpowiedź. * Pracuj samodzielnie. Postaraj się udzielić odpowiedzi na wszystkie pytania. * Nie używaj korektora. Jeśli pomylisz w zadaniach otwartych, przekreśl błędną odpowiedź i wpisz poprawną. * Korzystaj tylko z przyborów i materiałów określonych w regulaminie konkursu.   ***Powodzenia!*** | Czas pracy:  **120 min.** |

Imię i nazwisko ucznia

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Wypełnia Komisja Konkursowa po zakończeniu sprawdzenia prac

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| Zadanie | **I (22)** | | | | | | | | | **II (19)** | | | | | | | | | |
|  | 1a | 1b | 2 | 3 | 4 | 5a | 5b | 6 | 7 | 1 | 2a | 2b | 2c | 3a | 3b | 4 | 5a | 5b | 5c |
| Punkty możliwe do uzyskania | **3** | **3** | **2** | **2** | **2** | **4** | **1** | **3** | **2** | **2** | **1** | **1** | **2** | **1** | **4** | **5** | **1** | **1** | **1** |
| Punkty uzyskane |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **III (24)** | | | | | | **IV (35)** | | | | | | | | | |  |
| 1 | 2a | 2b | 3 | 4 | 5 | 1 | 2 | 3a | 3b | 4 | 5a | 5b | 6 | 7a | 7b | Razem |
| **5** | **4** | **2** | **2** | **1** | **10** | **7** | **2** | **3** | **3** | **2** | **6** | **4** | **1** | **2** | **5** | **100 pkt.** |
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Podpisy członków komisji sprawdzających prace:

1. (imię i nazwisko)………………………………………..(podpis) 2. (imię i nazwisko)………………………………………..(podpis)

CZTERY PORY ROKU

**We wszystkich zadaniach przyjmij do obliczeń:**

* **przyspieszenie ziemskie g=10 m/s2,**
* **gęstość wody d=1000 kg/m3, gęstość lodu 900 kg/m3**
* **gęstość srebra ds.=10500 kg/m3, gęstość złota dz=19300kg/ m3**
* **ciepło właściwe wody cw=4200 J/kgK**

**Zadanie I. WIOSNA (0 - 22 pkt.)**

1. Kra o masie 0,5 t płynie z nurtem rzeki z szybkością 2 m/s.
2. **Oblicz drogę, jaką pokona kra w czasie 1 godziny.**

**(0 -3 pkt.)**

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**Odpowiedź**…………………………………………….

1. **Oblicz pęd kry. (0 -3 pkt.)**

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**Odpowiedź**…………………………………………….

1. Rowerzysta zjeżdża z górki ruchem jednostajnym**. Zapisz, jaka wypadkowa siła działa na rowerzystę. Uzasadnij z jakiego prawa to wynika. (0 -2 pkt.)**

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1. Termometr na zdjęciu mierzy temperaturę powietrza na działce. **Odczytaj i podaj niepewność pomiarową pomiaru temperatury termometrem działkowym. Zapisz temperaturę jaką wskazuje termometr uwzględniając niepewność pomiaru.**

**(0 -2 pkt.)**



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1. W czasie wyładowań burzowych pojawia się błysk, a po pewnym czasie grzmot. Prędkość dźwięku w powietrzu wynosi ⅓ km/s, a prędkość światła – 3000000 km/s. **Wykorzystując powyższe informacje opisz sposób, w jaki oszacujesz swoją odległość od burzy. (0 -2 pkt.)**

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1. W chmurze burzowej dochodzi do rozdzielenia ładunków. Ładunek ujemny zwykle gromadzi się w dolnej części chmury, a dodatni w górnej.
2. **Zaznacz na rysunku znaki ładunków „+” lub „-” w obszarach A, B i C, a następnie zaznacz strzałką kierunek ruchu elektronów w czasie wyładowania atmosferycznego. (0 - 4 pkt.)**



1. **Podaj nazwę zjawiska, które odpowiada za powstanie ładunku w obszarze C.**

**(0 - 1 pkt.)**

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1. **Oblicz moc pioruna, jeżeli natężenie prądu wynosi 400 000 A przy różnicy potencjałów 2 000 000 V. Wynik podaj w gigawatach.**

**(0 - 3 pkt.)**

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**Odpowiedź**…………………………………………….

1. **Oblicz energię elektryczną wyładowania atmosferycznego związanego z przepływem ładunku 16 C przepływającego między chmurą i ziemią o różnicy potencjałów 2 000 000 V. (0-2 pkt.)**

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**Odpowiedź**…………………………………………….

**Zadanie II. LATO (0 – 19 pkt.)**

1. Nurek bada dno jeziora o głębokości 8 m. **Oblicz ciśnienie hydrostatyczne wywierane na nurka na tej głębokości. (0 -2 pkt.)**

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**Odpowiedź** …………………………………………….

1. Tabela przedstawia ciepła właściwe różnych substancji.

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| SUBSTANCJA | CIEPŁO WŁAŚCIWE (J/kg K) |
| woda | 4200 |
| asfalt | 1680 |
| piasek | 800 |

Wykorzystaj dane z tabeli.

* 1. **Ustal, która substancja nagrzeje się do najwyższej temperatury w słoneczny, ciepły dzień. (0- 1 pkt.)**

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* 1. **Ustal, temperatura której substancji wzrośnie najmniej. (0- 1 pkt.)**

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* 1. **Oblicz ilość ciepła potrzebną do ogrzania 5 kg piasku o 20 oC. (0- 2 pkt.)**

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**Odpowiedź**…………………………………………….

1. Okres wahań łódki pływającej po jeziorze wynosi 4 s. Długość fali wytworzonej na jeziorze wynosi 10 m.
2. **Zaznacz na rysunku długość fali. (0 -1 pkt.)**



1. **Oblicz częstotliwość i szybkość rozchodzenia się tej fali. (0 -4 pkt.)**

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**Odpowiedź** …………………………………………….

1. Wentylator elektryczny ma moc 50 W i jest przeznaczony do pracy pod napięciem 230V. **Oblicz natężenie prądu elektrycznego płynącego przez wentylator. Zaokrąglij wynik do drugiego miejsca po przecinku a następnie oblicz opór elektryczny wentylatora. (0-5 pkt.)**

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**Odpowiedź** …………………………………………….

1. Podlewając ogród za pomocą węża ogrodowego możemy zauważyć, że woda wydobywająca się z węża porusza się po różnych torach w zależności od kąta nachylenia węża (rysunek).



1. **Odczytaj z rysunku i zapisz, pod jakim kątem do poziomu należy ustawić końcówkę węża ogrodowego, by woda miała największy zasięg.**

**( 0- 1 pkt.)**

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1. **Odczytaj z rysunku i zapisz dwa kąty, dla których zasięg strumienia wody jest taki sam. ( 0- 1 pkt.)**

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1. **Ustal pod jakim kątem należy ustawić końcówkę węża, by zasięg wody był taki sam jak dla kąta 20o. (0- 1 pkt.)**

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**Zadanie III. JESIEŃ (0 – 24 pkt.)**

* + 1. Na bocznej szybie autobusu stojącego na przystanku krople deszczu tworzą ślad pod kątem 45o do pionu. Przy bezwietrznej pogodzie krople spadałyby pionowo z prędkością 10 m/s. **Narysuj na rysunku poniżej wektor poziomej prędkości wiatru oraz wektor wypadkowej prędkości kropli deszczu i opisz ich długości.**

**(0 - 5 pkt.)**

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* + 1. Z jabłoni z wysokości 2m nad ziemią spadło jabłko.

1. **Oblicz szybkość, z jaką jabłko uderzyło o ziemię**. **(0 - 4 pkt.)**

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**Odpowiedź** …………………………………………….

1. **Narysuj i podaj nazwę siły działającej na jabłko w czasie spadania.** **(0 - 2 pkt.)**



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* + 1. Po podłodze przesunięto skrzynię z jabłkami na odległość 4m. Wykonano przy tym pracę równą 600 J. **Oblicz siłę, jakiej użyto do przesunięcia skrzyni**.

**(0 - 2 pkt.)**

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**Odpowiedź** ……………………………………………

* + 1. Zdjęcie przedstawia krople deszczu na masce samochodu. **Podaj nazwę zjawiska, dzięki któremu woda przyjmuje kształt widziany na zdjęciu. (0 - 1 pkt.)**



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* + 1. Na urodziny Iga dostała srebrny łańcuszek pokryty złotem. Masz do dyspozycji dokładną wagę, menzurkę z dokładną podziałką, wodę oraz tablice, z których odczytasz gęstość złota dz oraz gęstość srebra ds. **Pomóż Idze ustalić doświadczalnie masę złota i masę srebra, z których wykonano łańcuszek. Zapisz kolejne czynności i obliczenia.**

**(0-10 pkt.)**

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**Zadanie IV. ZIMA (0 – 35 pkt.)**

1. Łyżwiarz jedzie po lodowisku ruchem jednostajnym z prędkością 1,5 m/s. Gdy łyżwiarz przestał poruszać nogami, to zatrzymał się po czasie 20 s. Korzystając **z zasady zachowania energii**, **oblicz drogę hamowania łyżwiarza**.

**(0-7 pkt.)**

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**Odpowiedź…………………………………………………………………………………….**

1. **Oblicz energię kinetyczną krążka hokejowego o masie 0,16 kg poruszającego się z prędkością 40 m/s.**

**(0 - 2 pkt.)**

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**Odpowiedź……………………………………………….**

1. W mroźny dzień ( -12oC) w butelce pozostawionej na balkonie zamarzło ok ½ litra wody. Po dopełnieniu butelki ciepłą wodą z kranu bryła lodu uniosła się w butelce, ale zahaczyła o zwężenie butelki. Sytuację przedstawia rysunek.
2. **Narysuj, zachowując proporcje, siły działające na lód w butelce i podaj ich nazwy.**

**(0-3pkt.)**



1. **Ustal, czy po stopieniu lodu poziom wody w butelce wzrośnie i część wody wypłynie, a może zmaleje lub nie zmieni się. Odpowiedź uzasadnij. (0-3pkt.)**

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1. 10 lutego 1929 roku w Żywcu zanotowano najniższą temperaturę w Polsce. Wynosiła ona -40,6oC. **Wyraź tę temperaturę w kelwinach**. **(0-2 pkt.)**

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**Odpowiedź……………………………………………….**

1. Świeży śnieg ma gęstość 100 kg/m3. Na dach o powierzchni 200 m2 spadło 10 cm śniegu.
2. **Oblicz objętość śniegu i jego siłę nacisku na dach. (0- 6 pkt.)**

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**Odpowiedź**…………………………………………….

1. Woda z roztopionego śniegu z dachu spływa do zbiornika o pojemności 3 m3. **Ustal, czy woda zmieści się w tym zbiorniku. (0- 4 pkt.)**

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**Odpowiedź**…………………………………………….

1. Żyrandol oświetlający pokój składa się z 3 żarówek o mocy 40 W każda połączonych równolegle. **Narysuj schemat połączenia tych żarówek**.

**(0 - 1pkt.)**

1. Zimą Kuba dużo czyta. Do czytania używa okularów z soczewkami o ogniskowej 0,4 m.
2. **Podaj jakie soczewki – skupiające czy rozpraszające – znajdują się w tych okularach i jaką wadę korygują. (0 - 2 pkt.)**

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1. **Narysuj, z zachowaniem proporcji, obraz przedmiotu uzyskany za pomocą soczewki tych okularów, jeżeli przedmiot znajduje się w odległości 0,6 m od soczewki. Zaznacz na rysunku ogniskową oraz odległości przedmiotu i obrazu od soczewki. Wymień cechy tego obrazu.**

**(0 - 5 pkt.)**



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